SITE RADIOLOGICAL CHARACTERIZATION REPORT

November 2013
Clean Harbors (Reid Supply) Facility
Wichita, KS

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Houston, TX 77017

Project ID # 2950-NR-H026

RCRA

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APPENDICES

Executive Summary:

USA Environment was retained by Clean Harbors to perform a radiological characterization of the Wichita, KS facility in order to confirm and supplement data presented in the Kansas Department of Health and Environment report from a 2010 survey of the same property.[1] The site is located at 2549 North New York Avenue in the north- central portion of Wichita, Kansas. The site is approximately 6 acres and includes open field areas, paved/asphalted areas as well as several structures. USA personnel were mobilized to the site on three separate occasions in order to conduct gamma walkover surveys, alpha and beta contamination surveys, and soil sampling beginning in late August and continuing through early October 2013. Initial gamma surveys and soil sampling indicated no area exceeded an action level of 20 μR/hr or 5 pCi/g above background of radium-226. However, two areas were noted by KDHE and the EPA as areas of interest due to measurements found to be below action levels, but above background levels. In addition, all buildings were added to the characterization workplan. Subsequent surveys and sampling results as well as indoor contamination surveys confirmed that all buildings are free of radiological contamination and soil concentrations do not represent a need for radiological remediation or radioactive material licensing.

1. Introduction

USA Environment has been retained by Clean Harbors to perform a radiological screening survey of the Wichita, KS facility in order to confirm and supplement data presented in the Kansas Department of Health and Environment report from a 2010 survey of the same property.[1] The site is located at 2549 North New York Avenue in the north- central portion of Wichita, Kansas. The site is approximately 6 acres and includes open field areas, paved/asphalted areas as well as several structures. Adjacent properties include the Missouri Pacific Railroad (MoPac RR) and the Union Pacific Railroad (UPRR) facilities to the north and west, and the former El Paso Corporation refinery to the south (previously decommissioned and demolished by USA Environment LP). The site is additionally bordered by New York Avenue, East Fork of Chisholm Creek, Hwy I-135 and a residential area are to the east. The site was formerly owned and operated by Reid Supply Company from the mid-1970's to early 1986. Operations conducted during this time frame included hazardous waste operations with spent solvents, spent electroplating baths, and other hazardous sludge.

Although ownership has changed many times since 1986, the property has always been involved with chemical processing and waste management activities. Solvents that had been used with radioluminescent (radium) paints are known to have been one of the chemicals processed at this facility. Exact quantities or concentrations of radium in these solvents are not known. Likewise, data concerning the specific handling/processing protocols for these radium-impacted solvents is not known. The Kansas Department of Health and environment conducted a screening surface survey of the site in October of 2009. Several portions of the site were determined by KDHE to be impacted by radium based on this survey. One section was found to have elevated gamma radiation levels of 35 μR/hr, approximately three times the assumed background of 10 μR/hr. Soil sampling or gamma spectroscopy was not conducted at this time. Based on this screening survey, KDHE concluded that a specific radioactive materials license is required for any activities being conducted on this property.

USA Environment was retained by Clean Harbors in order to provide a specific radioactive materials license and radiologic safety oversight for activities to be conducted during characterization and remediation of the facility. In order to provide a work plan for the radiologic oversight, USA Environment requested additional data concerning radiological characterization of the assumed radium-impacted portions of the site. Since more detailed data was not available, USA Environment developed a workplan to gather the required data. This workplan included detailed walkover gamma combined with GPS logging data survey of the assumed impacted locations and biased soil sampling based on past and present survey results. USA Environment mobilized to the site twice to conduct walkover surveys and soil sampling. Data gathered during the first two mobilizations indicated radioactive contamination was not present in quantities to warrant licensing or remediation actions. USA was mobilized a third time in order to gather sufficient additional data to fully characterize the entire site. The surveys and sampling are discussed further in the sections below.

2. Radiological Survey

USA Environment first mobilized to the site on Thursday August 15th, 2013 in order to conduct the walkover survey and soil sampling. Due to heavy rains over the previous two weeks, the site conditions were less than ideal for surveying due to saturated ground and standing water in several locations. However, the areas designated as radium-impacted by the previous KDHE survey were accessible and the activities proceeded as planned. During the downloading of the files from the data-logger, errors were encountered that resulted in corrupt, unreadable data. Despite several attempts to recover the data, they were deemed irrecoverable and a second survey scheduled. USA Environment remobilized to the site on September 9th, 2013 in order to repeat the walkover survey and procure additional soil samples.

The walkover surveys utilized gamma-ray, 3"x3" NaI scintillation detectors coupled to Ludlum 2241-3 survey meters, a sub- meter global positioning systems (GPS), and data loggers to automatically record the radiation levels and their locations as the field operator performs the walkover. Figure 1 displays the aerial view of the site with the individual survey units outlined. Based on the initial KDHE report, units 1, 2, 3,12, and 13 were initially assumed to be impacted, units 4, 5, 6, 14, 15, 16, and 17 potentially impacted, and the remainder of the units having a low probability of being impacted.

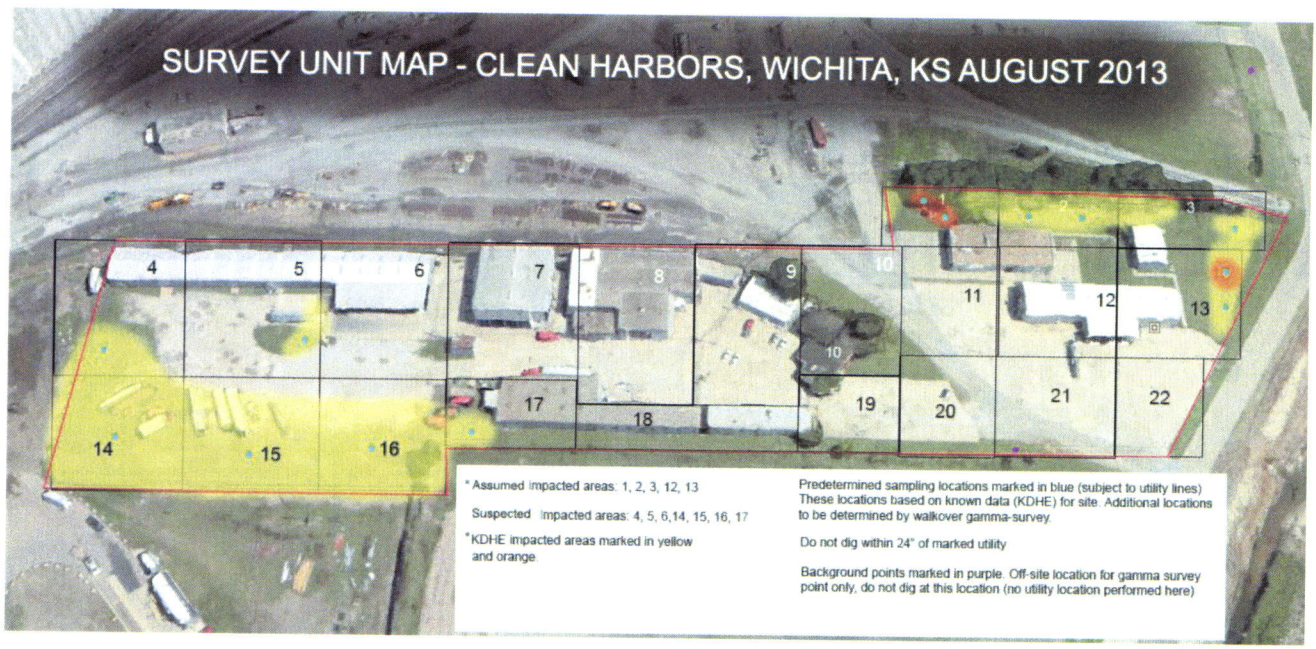


Figure 1. Clean harbors Facility divided into 22 survey units with the KDHE assumed contaminated zones highlighted.

The survey over the assumed-impacted areas was conducted with the detectors mounted 15 cm (6") above the ground, with the technician walking traverses across the survey units with a 1m traverse spacing. This approach provides the field survey operator with continuous measures (once per second) of the distance to the right or left of a target traverse line, guiding the course corrections to follow the target line within approximately 0.5 m. Together, the successive traverses form a serpentine pattern that provides approximately one radiation measurement in every 1 m^2 area based on a traverse spacing of 1 meter (m) and a walking velocity of 0.5 m/s.

Areas of lower probability were walked with a wider traverse spacing of 3 m. These areas were suspected of having diffuse contamination spread uniformly across the areas as depicted by the previous KDHE survey. Paved surfaces such as parking lots were not previously identified as impacted and were assumed to be of very low probability of being contaminated. These areas received only individual, sparsely-distributed survey points during initial walkover surveys. During the third and final mobilization to the site, these areas were also surveyed with a 5m traverse spacing.

2.1 Survey Sensitivities, Detection Limits and Field Instrumentation

The following radiological field survey instruments will be used with the detection sensitivities having been determined following the guidance of NUREG-1507 using nominal literature values for background, response, and site conditions for the Ludlum detectors.

All walkover surveys were performed using 3" x 3" sodium iodide (Nal) scintillation detectors (Model 44-20, Ludlum Measurements Inc., Sweetwater, TX) coupled serially to count rate meters (Model 2241-3, Ludlum). The survey meters were coupled in turn to sub-meter global positioning systems (GPS) (Trimble Pro XRS) to automatically record detector positions every second. The data logger used to store the detector positions recorded the gamma radiation exposure rates (cpm) every two seconds. The logged data from the survey meters and GPS systems was downloaded daily to field computers for transfer and analysis.

Since all the detectors were calibrated to cesium-137 efficiency sources, a direct reading of μR/hr cannot be determined due to the variance in energy response of NaI to gamma radiation. Instead, direct measurements were made in units of counts per minute. A Ludlum model 19 survey meter , which has a uniform energy response across the energies associated with radium-226 and efficiency sources was then used to conduct gamma exposure rate surveys at the sampling locations. The readings in μR/hr were then correlated to the direct cpm measurements taken at the identical locations using the Ludlum 4421-3 survey meter with the 3"x3" NaI detector. A table containing the specific measurements made using each detector for each of the sampling locations is contained in Appendix III. Figure 2 below graphically displays this data and the correlation for converting cpm measurements to μR/hr.

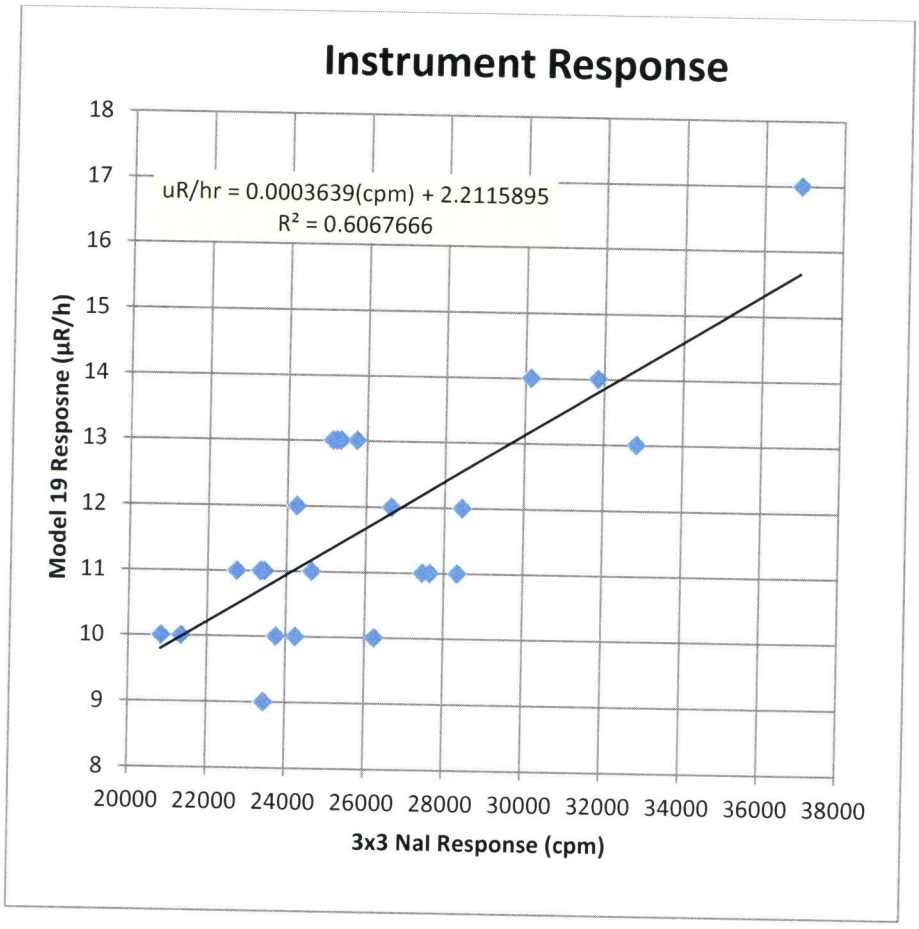


Figure 2. NaI detector response correlated to the Model 19 Response in order to determine μR/hr gamma exposure measurements from cpm data.

In addition to gamma-walkover surveys, static alpha and beta counting was performed inside structures along with wipe sampling and subsequent alpha/beta counting of the wipes. Structures were divided into survey units dependent upon the use and layout of the structure. Generally speaking, for structures associated with waste handling and storage, each room was a survey unit. For the large warehouse-style rooms such as in Buildings B and C, rooms were further divided into multiple survey units. The alpha, beta and wipe counting was conducted across floor surfaces as well as the lower 30" of walls. Direct alpha/beta counting was performed using Ludlum 43-89 detectors. Wipe samples were counted using a Ludlum 2929 coupled to a 43-10 alpha/beta detector. One-minute count times were used for all counts.

All instrumentation were calibrated (within the past 12 months). Daily field performance checks (i.e. background and source check) were conducted in accordance with individual instrument use procedures. These performance checks were performed prior to daily field activities and at any time the instrument response appears questionable. Calibration records for the detectors used are included as an appendix to this report.

2.2 Soil Sampling

Several locations were preselected for sampling based on the KDHE survey data. Additional locations were to have been selected based on an action level of 20 μR/hr (as selected by KDHE[1]). In the absence of any areas meeting the action level, sampling locations were to be selected based on the available data and the judgment of the field technicians in order to obtain representative data for the site. A total of 29 discrete locations were selected for sampling. During the initial mobilization to the site, 10 locations were sampled. These are depicted on Figure 3 as sampling locations 1a, 1b, 2, 5, 10a, 13, 14, 15, 17, 21 where the number represents the survey unit location the samples were collected from. An additional 5 locations (4, 13b, 16, 18, 19) were sampled during the subsequent mobilization to the site along with a 10-point composite sample that was collected across an area in Unit 1 based on analytical data obtained from the first mobilization's data set. This composite was taken in the upper 15 cm overtop the location of the former drain line. During the last mobilization in October, samples were collected from an additional 11 locations in Unit 1 and three additional locations in Unit 5.

Figure 3. Soil sampling locations.

Each discrete sampling location during the first and second mobilization had one sample from the top 12" of soil depth and one sample from the second 12" of soil depth (12"-24" below surface) collected. During the last mobilization samples were also collected down to the natural clay layer. This resulted in two locations having a third sampling depth layer. All samples were analyzed via gamma spectroscopy by Eberline Services in OakRidge, TN. In addition, the 10-point composite was collected evenly distributed across an area identified as previously containing a drain system. Initial soil data from the top 12" had indicated levels slightly elevated from background concentrations in Unit 1. In order to compare concentrations to KDHE limits[1], the composite samples were collected to a depth of 15 cm (6"). Analytical reports for all sampling locations are contained in Appendix II of this report.

3.0 Survey and Sampling Results

3.1 Outdoor Gamma Walkover Surveys

Figure 4 displays the survey results and sampling locations from the first two mobilizations overlaid onto satellite imagery of the facility. (A larger version of this map is contained in Appendix I) Gamma survey results were unremarkable in that the action level of 20 μR/hr was never recorded in any area surveyed. The maximum gamma radiation levels were found to be 16 μR/hr.

Figure 4. Survey results and sampling locations from first two mobilizations.

The minimum, median, maximum and average values of measurements recorded are listed in Table 1. The median value corresponded to on-site areas assumed to be non-impacted (Southeast corner near sample location 21 and employee parking areas) and was determined to be 11 µR/hr. An off-site location over similar soil (shown in upper Northeast corner of map in Figure 1 on the public right-of-way alongside HWY I-135) was also found to be 11 µR/hr. This is consistent with typical background measurements across this region of the United States and was used as the background gamma exposure rate for this facility. Measurements displayed on the map were color-coded based on their values as compared to the average. Table 1 lists the statistical data for the distribution. Measurements greater than two standard deviations above the average (13.2 µR/hr) were assumed to be "elevated" levels and are depicted in shades of green on the survey map. Although elevated above the determined background, elevated results did not indicate significant widespread contamination.

Table 1. Statistical data for survey results

	cpm	uR/hr	
min	11230	6	
median	22730	11	
65.0%	24350	11	
85.0%	26430	12	
90.0%	27230	12	
95.0%	28830	13	
97.5%	30230	13	
99.9%	35930	15	
Max	38530	16	
Average	22600	10.4	
StDev	3850		

Although the paved and gravel roadways and parking areas had periodic point measurements taken for gamma exposure rates, an additional systematic walkover survey was conducted using the NaI 3"x3" scintillation detectors with a minimum traverse spacing of 5m. The following figures display the results of this survey.

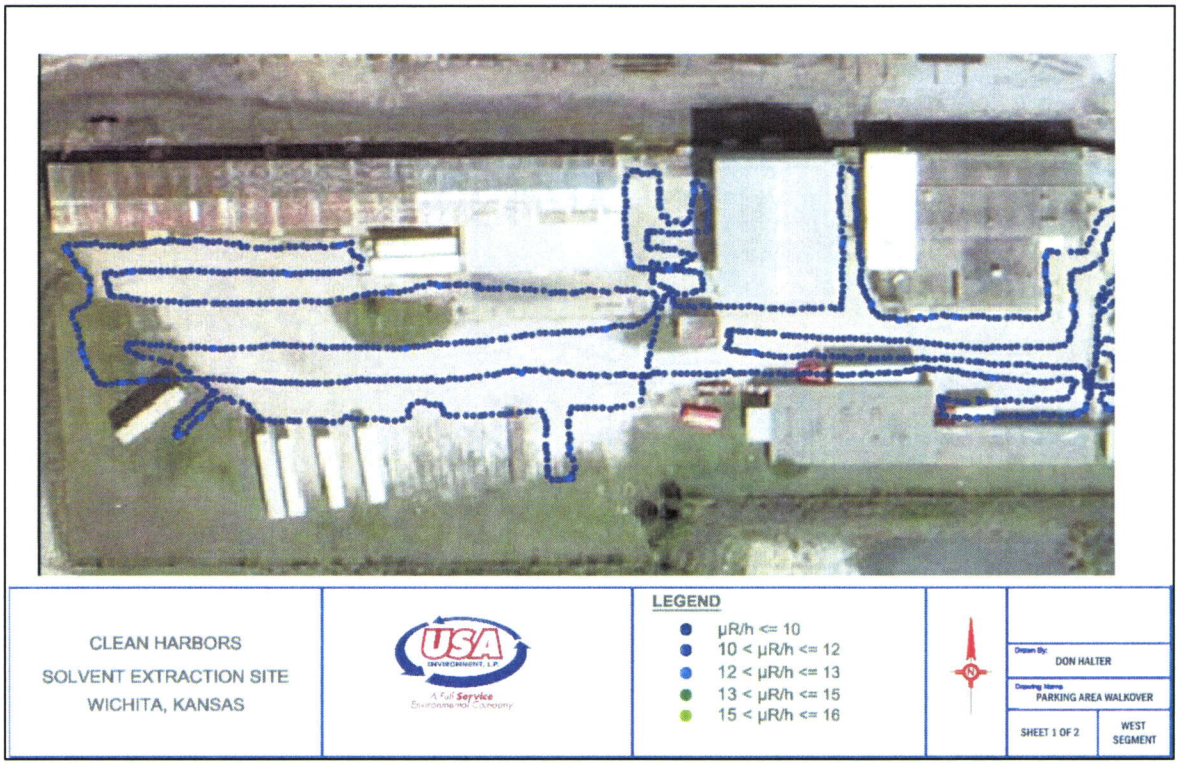


Figure 5a. Gamma-walkover survey for paved oudoor areas (West half).

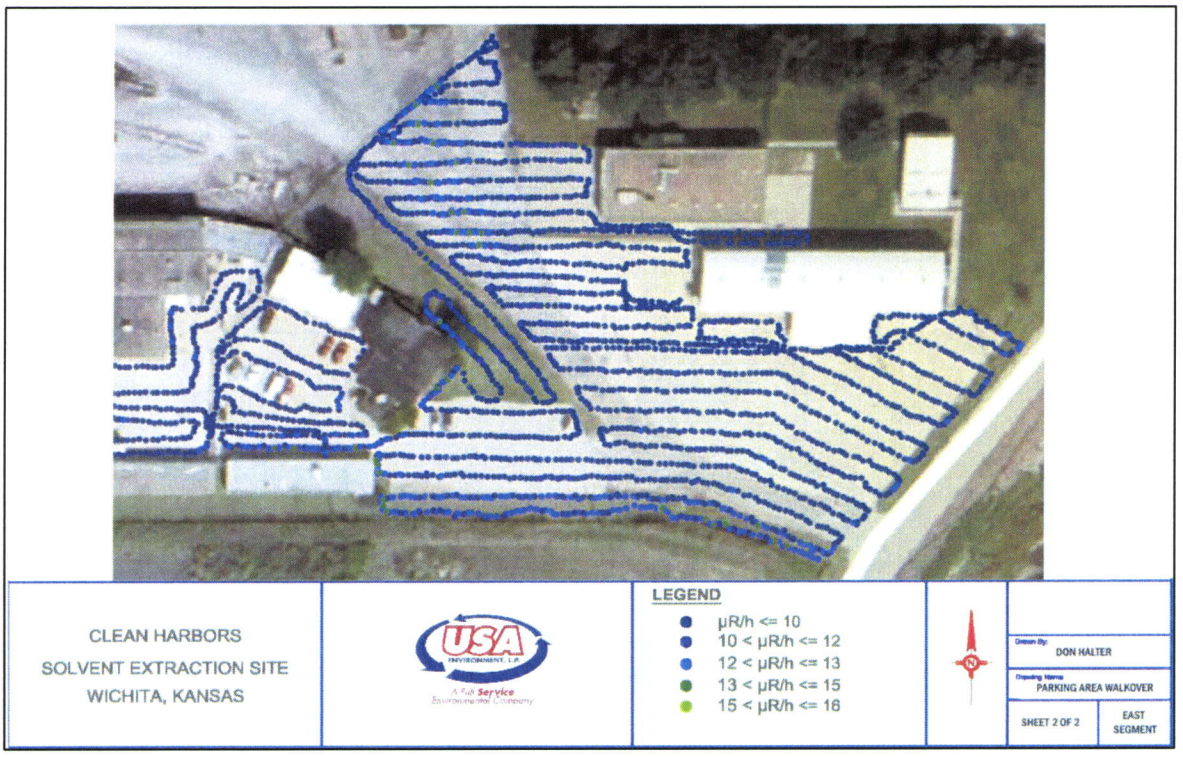


Figure 5b. Gamma-walkover survey for paved oudoor areas (East half).

No measurements exceeded the 20 mR/hr action level. Only a few areas, already noted in previous surveys, were found to have measurements above background. The majority of these areas were adjacent to the red-clay brick walls of the administrative buildings. After reviewing the gamma-walkover data, it was suspected that the red-clay bricks contained low levels of NORM and were contributing to the gamma exposure rates detected adjacent to the buildings rather than any non-natural source present in the soil in these areas. The additional walkover results are displayed in Figures 5a and 5b above. Larger versions of these survey maps are included in the appendices.

3.2 Indoor Gamma Walkover, Static Alpha/Beta Counting and Smear Sampling

Structures were surveyed indoors using NaI scintillation detectors for gamma walkovers, direct reading alpha/beta detectors for total contamination detection, and wipe counting for detection of any removable contamination. Buildings were divided into survey units with the size and configuration of the survey unit determined by the layout and use of the building. Survey units were further divided into sub-units, also based on use. Buildings such as buildings B and D associated with waste handling and storage utilized a higher frequency of survey/sampling locations than buildings such as building A which was an administrative building. In non-administrative buildings, the sub-units were laid out and marked directly on the flooring as can be seen in the figure below.

Figure 6. Unit 2 of Building B showing the corner markings for each sub-unit.

Direct alpha/beta counts were taken at random locations within each sub-unit and the results recorded. High-biased alpha/beta survey locations were chosen for sub-units that were found to have elevated gamma measurements. Likewise, one wipe sample per sub-unit was taken from flooring with 50% of the lower wall sub-units. As with the direct alpha/beta counts, if a sub-unit contained elevated gamma measurements, the wipe sampling location was biased for the elevated area. All structures except for the two administrative buildings received 100% coverage with a gamma walkover survey for flooring and the lower portion of the walls. Administrative buildings received 50% coverage. Background measurements indoors ranged from 8-14 μR/hr, dependent upon building construction material. Some instances of elevated gamma measurements were found, but were attributed to naturally occurring radioactive material in the building construction materials. (Individual buildings will be discussed below. Direct alpha/beta detection as well as wipe sample counting results were all consistent with background levels. No instances of contamination of any type were found in any building.)

Administrative Buildings

This set of buildings consisted of Building A, the former office and main gate building which is now unused, the current main office building to the right of the main gate which is still being used, and the cafeteria building just behind the main office building. Gamma walkovers were onducted over 50% of the floor surfaces in these buildings since they were not associated with waste handling operations and had a very low potential for being contaminated. Background gamma measurements were found to be 14 mR/hr in Building A. Most areas in this building were consistent with background. However, the front foyer and restroom areas were found to have gamma readings up to 28 mR/hr. It was determined that these rooms contained floor and wall tiles that were made from natural clay ceramicsand glazings that contained low levels of NORM. In addition, the red-clay bricks used for the exterior building veneer also were found to contain NORM. The building construction materials resulted in the increased gamma exposure rates for this building. Likewise, the current main office also had gamma readings of 14 μR/hr in rooms adjacent to exterior walls made from the red bricks.

Limited direct alpha/beta counting and sampling was conducted in these buildings based on their historic and current use. These measurements and sampling were conducted in most probably locations such door entryways, lobbies and other high-use areas. The foyer and bathroom area of Building A were included to ensure the elevated gamma readings were actually due to material within the construction materials and not external contamination. No removable contamination or fixed alpha contamination was detected. Direct beta counting was only slightly elevated and attributed to the natural emission from NORM contaned in the surface of the bricks and glaze.

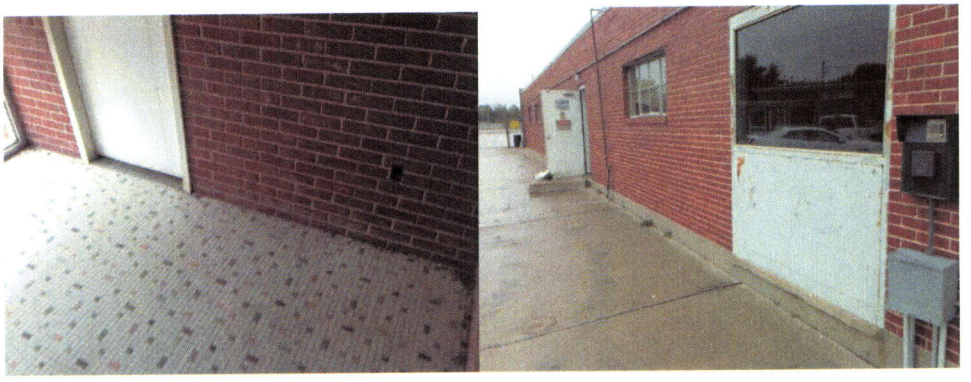


Figure 7. Red clay brick and ceramic tile in the foyer and on the veneer of Building A.

Building B

Building B was a staging area for hazardous waste drums. In this building, drums were segregated based on waste type and staged for further processing. This area was assumed to be a class 2 area due to moderate potential for contamination. This building was divided into five survey units as shown in the figure below.

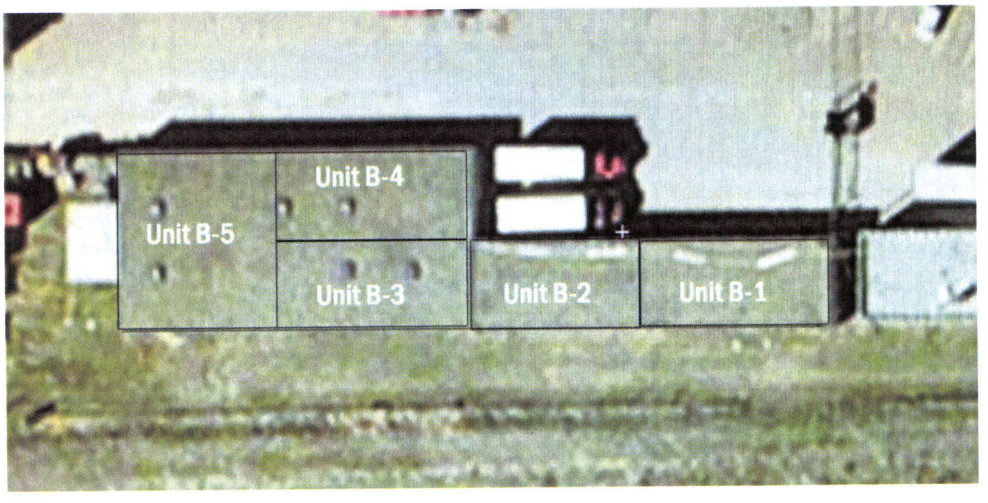


Figure 8. Building B and its survey units.

Units 1 and 2 were individual rooms, with units 3, 4 and 5 being divisions within the third large room. Each unit was divided into sub-units using an 8' x 8' grid pattern. This resulted in ~ 25-30 direct alpha/beta scanning locations and wipes and ~120 for the entire building. Gamma exposure rates averaged 10 uR/hr for the entire building with no elevated readings found. Likewise, no elevated removable or total alpha/beta contamination was found.

Building C

Building C consists of a metal roof and raised, bermed ground floor. This structure houses the large hazardous waste treatment/processing tanks and only has one enclosed wall on the North face. This entire structure was considered a single survey area. All surfaces except a portion of the rear (North) end that could not be accessed due to equipment and scrap metal received 100% coverage during the gamma walkover. In addition, the bases and interiors of tanks (when accessible) were also surveyed. All gamma exposure rate measurements were less than 9 μR/hr. This structure was divided into 23 sub-units. A total of 35 locations were chosen for direct alpha/beta measurements and wipe sampling and in some cases included the tanks themselves. No instances of contamination of any kind were detected.

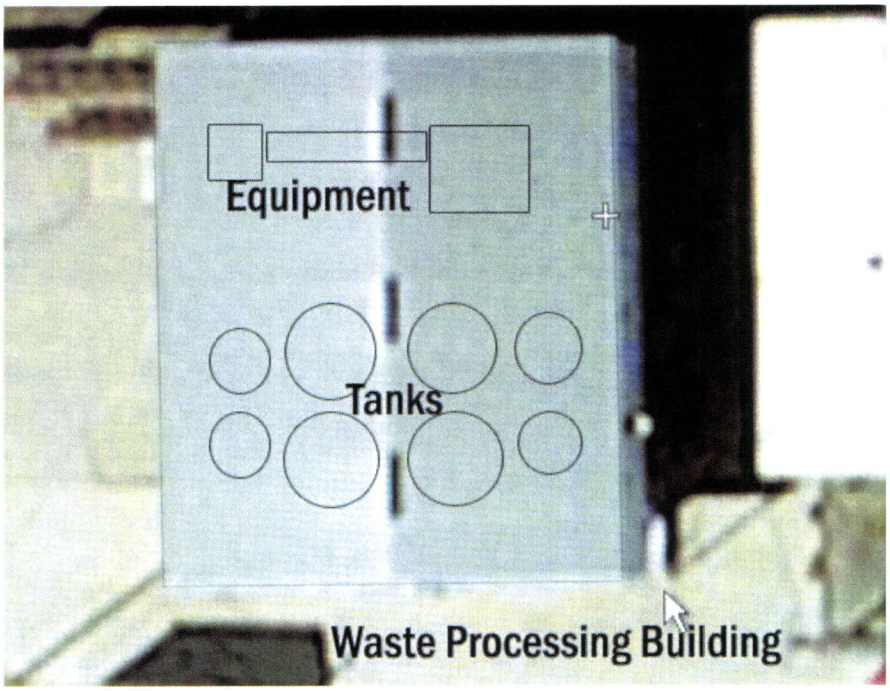


Figure 9. Building C – Waste Processing Building

Building D

Building D consisted of overhead hazardous waste storage tanks used for storage of material just prior to pumping over to the treatment processes of Building C. This is a two-story structure that has had additions constructed at some point in the past. This building was divided into 11 survey units. Most units were individual rooms, however, for the records storage and supplies storage rooms on the upper floors, multiple rooms were included in a single survey unit with the individual rooms being the sub-units.

Unit 1 was a material receiving room and was a large open room ~ 25' x 40'. This room was divided into sub-units 8' x 8'. During the 100% gamma survey, all interior areas were less than 12 μR/r over flooring with the exception of the following: areas along the wall base on the South, North and East walls were 14-16 μR/hr along the wall/floor interface; and the entire West wall and interface between wall and floor were 14-18 μR/hr. While not exceeding the action level of 20 μR/hr, these were distinguishable from background. It was initially suspected that trace amounts of contamination may be

present along the crevices between walls and floors. Direct alpha/beta counting as well as wipe sampling did not result in the detection of any contamination. Upon investigation, it was discovered that the exterior base of the building was constructed of the same red-clay brick used on the administration buildings. The decorative borders were resulting in slightly elevated gamma readings along the wall/floor interface on the interiors. Likewise, the entire West wall is constructed of this red brick and results in an average gamma exposure rate of 15-16 μR/hr along its surface.

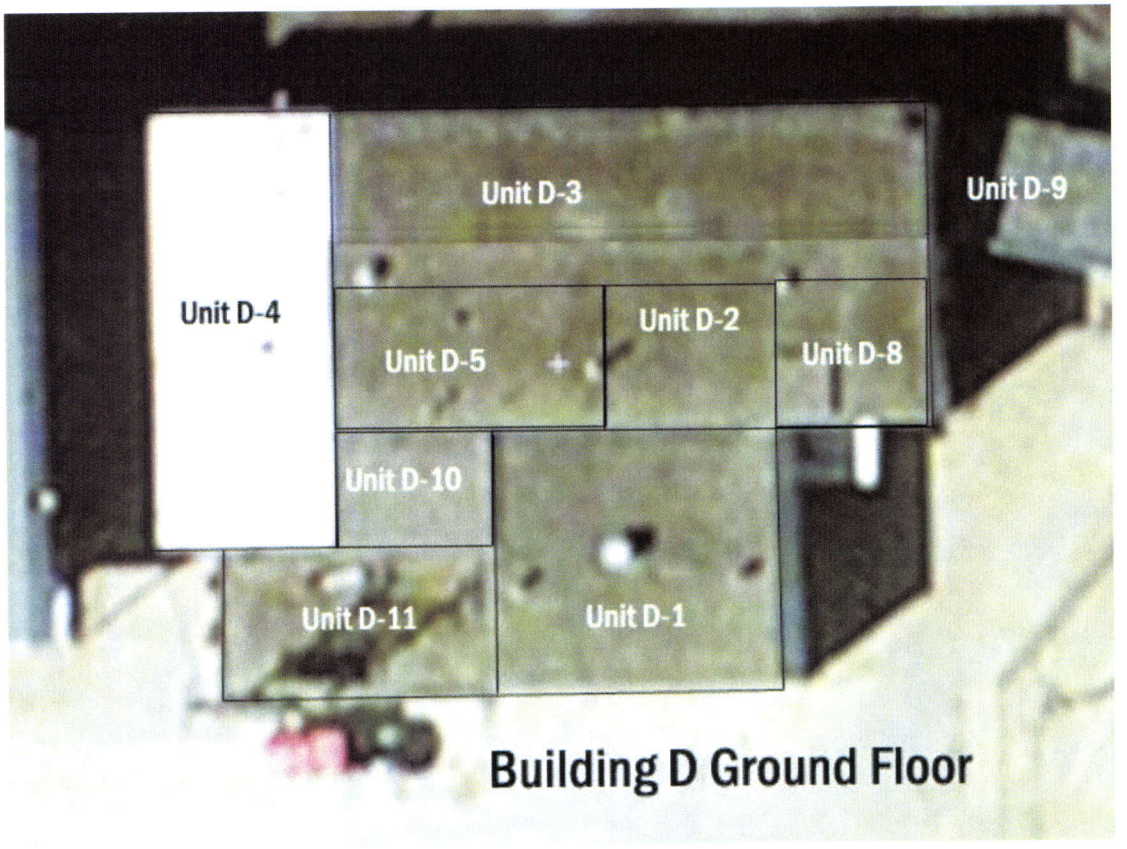


Figure 10. Building D ground floor survey unit layout.

Unit 2 had similar findings. This area had numerous locations along walls with gamma measurements from 14-16 μR/hr. Because of this, the unit was divided into smaller 5'x5' sub-units to ensure adequate coverage of the surfaces for alpha/beta detection. No alpha or beta radiation above background was detected in any of the locations for direct or removable contamination. It was also noted that all areas associated with slightly elevated gamma exposure rates also contained painted-over decorative borders constructed from the red brick.

Figure 11. Decorative red-brick base around building D.

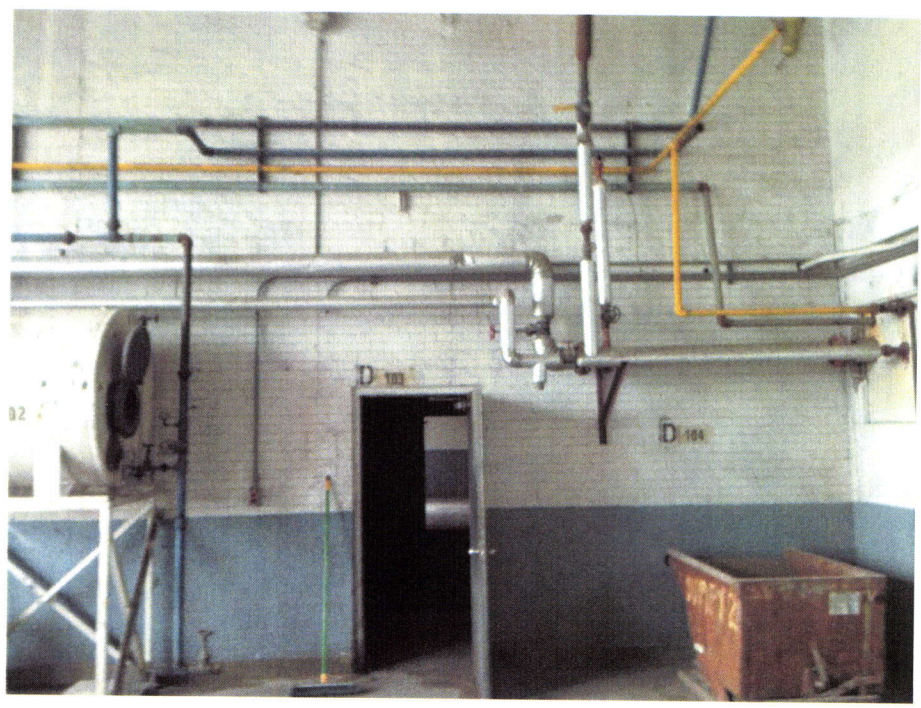


Figure 12. West wall of survey Unit D1 showing the entire wall being comprised of painted red-clay brick.

Unit 3 was a long corridor along the North face of the building. This area was not associated with storage of hazardous waste, but it was assumed that material could have been moved through this area. This area was divided into 14 sub-units. All gamma measurements were below 10 μR/hr and no alpha/beta contamination was detected with direct counting or wipe sampling.

Unit 4 was the area considered to be the highest probability of contamination. This unit contained the overhead waste storage/transfer tanks. Evidence of leaking could be seen on the now-clean tanks as

well as chemical erosion streaks down the walls of this room. The floor consisted of a chemical-resistant coating overtop concrete. As with the previous units, all gamma measurements were at or below background levels with the exception of the front (South face) along the wall/floor interface associated with the decorative trim of red brick. No instances of alpha/beta contamination were detected via direct counting or wipe sampling.

Unit 5 was an equipment room containing generators, pumps, small furnaces and other mechanical equipment. All gamma measurements during the 100% coverage survey in this room were at or below background measurements. No alpha/beta contamination was detected via direct counting or wipe sampling.

Unit U6 was previously the office space, records storage and office supply storage for the waste processing. Several small rooms were combined into this survey unit due to the lower likelihood of contamination. All areas still received a 100% gamma survey coverage, with all measurements being at or below background. Five locations were chosen for direct alpha/beta counting and wipe sampling with no instances of contamination being detected.

Unit U7 consisted of the upper floor receiving bay and the wooden floored area with chain-fence cages containing equipment supplies. All areas were surveyed for gamma with all measurements being below 8 μR/hr. The bay as well as each cage area and the adjacent corridor were used as sub-units. No instances of alpha/beta contamination were detected via direct counting and wipe sampling.

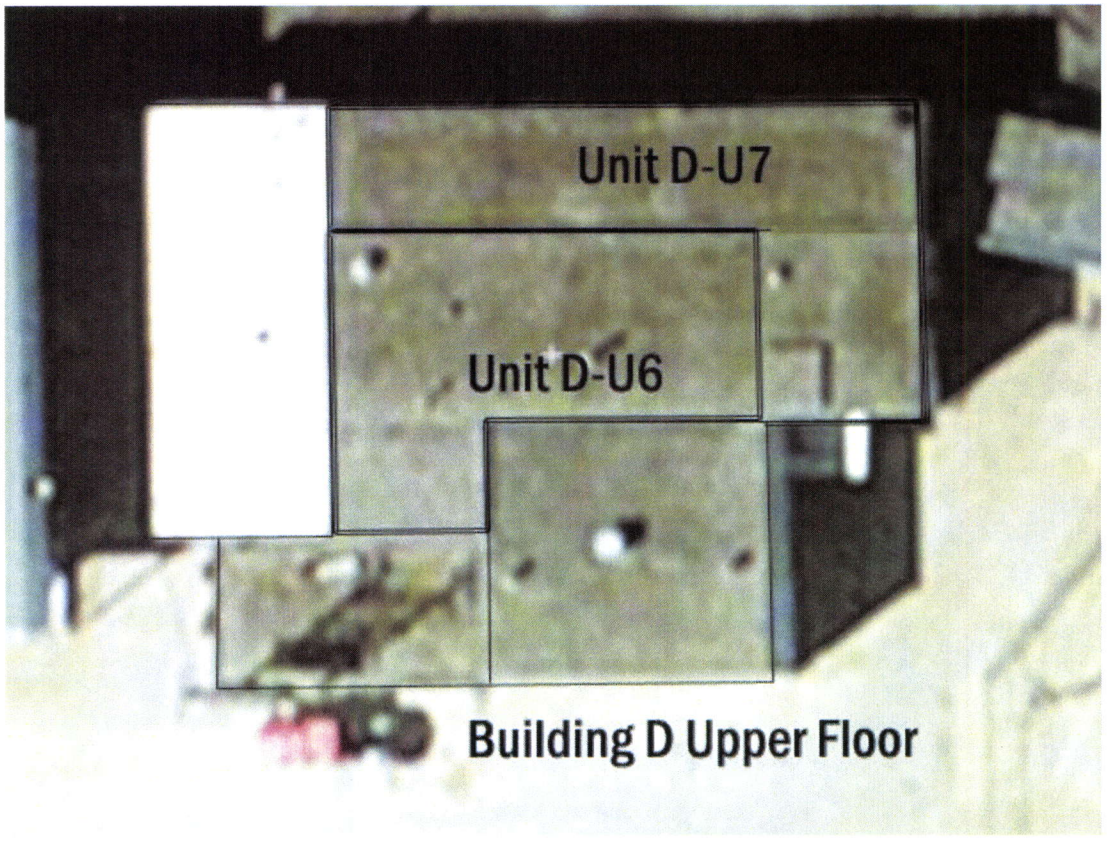


Figure 13. Building D upper floor survey unit layout.

Unit 8 was the lower receiving bay shipping/receiving supplies and equipment. This room was at the opposite end of the building from the waste handling process and was ~ 12' x 16'. This room was divided into three sub units. All gamma measurements were at or below background levels with the exception of the south face that contained a strip of the decorative red brick around the roll-up bay door. No alpha/beta contamination was detected via direct counting or wipe sampling.

Unit 9 was an addition building off the East end. This was a maintenance supply and vehicle storage building/garage and not associated with waste handling processes. This area was divided into 5 sub-units. No gamma measurements above background were detected and no alpha/beta contamination was found via direct counting and wipe sampling.

Unit 10 was another equipment storage area located between Unit 1 and 4. This room contained equipment cabinets with household cleaners, hand tools and similar items. This area was divided into four sub-units. The South face of this room, constructed from the red brick, was found to have gamma measurements from 14-16 μR/hr as did the adjacent room also containing the red brick. All other gamma measurements in this room were at or below background levels. No alpha/beta contamination was detected via direct counting and wipe sampling.

Unit 11 consisted of hazardous material handling areas. Two large enclosures were located against the North face of this room. These were used for filling/removing hazardous waste from drums. All gamma measurements in the open portions of this room were at or below background except for the South face interface between the walls and floor associated with the exterior decorative trim of red brick. The interiors of the fill station enclosures had gamma exposure rates of up to 18 μR/hr. Direct alpha/beta counting and wipe sampling was done on floors as well as walls of these enclosures with no instances of contamination being detected. Upon inspection, it was determined that the back wall of these enclosures as well as the main wall of the room was constructed of the red brick. The multiple layers of the red brick containing NORM were resulting in the elevated gamma readings. Since no detectable levels of contamination could be found on any floor or wall within these enclosures, it was assumed that all elevated gamma exposures were attributed to the NORM containing brick as with the foyer of the administrative building.

All elevated gamma exposure rates detected within the Building D complex were associated with the red-clay brick being used as decorative trims. Even with the red brick, no areas were found to exceed the action level of 20 μR/hr. The lack of any detectable alpha/beta contamination via direct counting and wipe sampling supported the assumption that all elevated gamma measurements were due to NORM sources in the building construction materials. This building was determined to be non-contaminated.

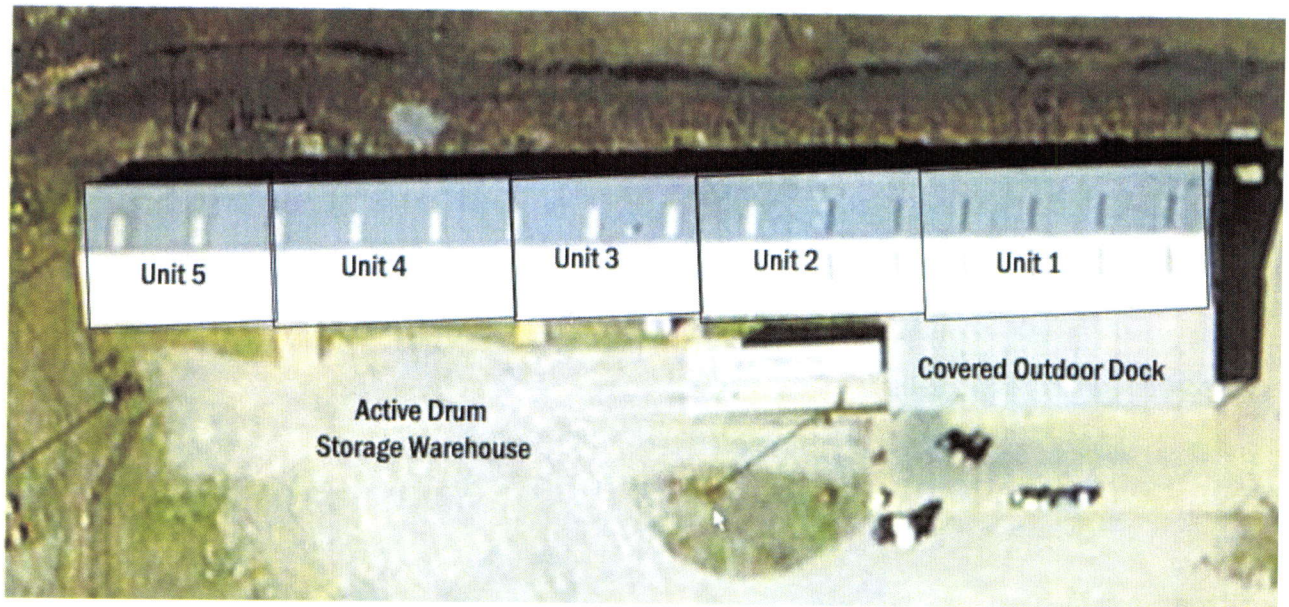


Figure 14. Building E – The current active drum storage warehouse.

Active Drum Storage Building (Building E)

The drum storage building is located in the West portion of the property and consists of a long warehouse with metal walls and roof and was also considered a class 2 area due to the nature of the activities being carried out in this building. This building was divided into five survey units consisting of 18-21, 8' x 8' sub-units each. As with all other buildings, this building was surveyed with 100% coverage for gamma exposure rate measurements. No measurements were found in excess of 11 mR/hr with the exception of measurements taken directly adjacent to drums containing waste activated charcoal filter media. Clean Harbors staff were asked to relocate the drums to allow for a survey of the floor in that area. Once the drums were moved, the gamma survey indicated only background gamma levels on the floor. No alpha/beta contamination was detected via direct counting and wipe sampling for this building.

Building I

Building I is located in the Northeast section of the property. The historic use of this building is not clearly identified, but it is assumed to have been used with the solvent storage. The drain line suspected of being radium impacted originated from this facility. This building was assumed to be a class 2 area and was divided into four survey units, with each unit corresponding to a room within this building.

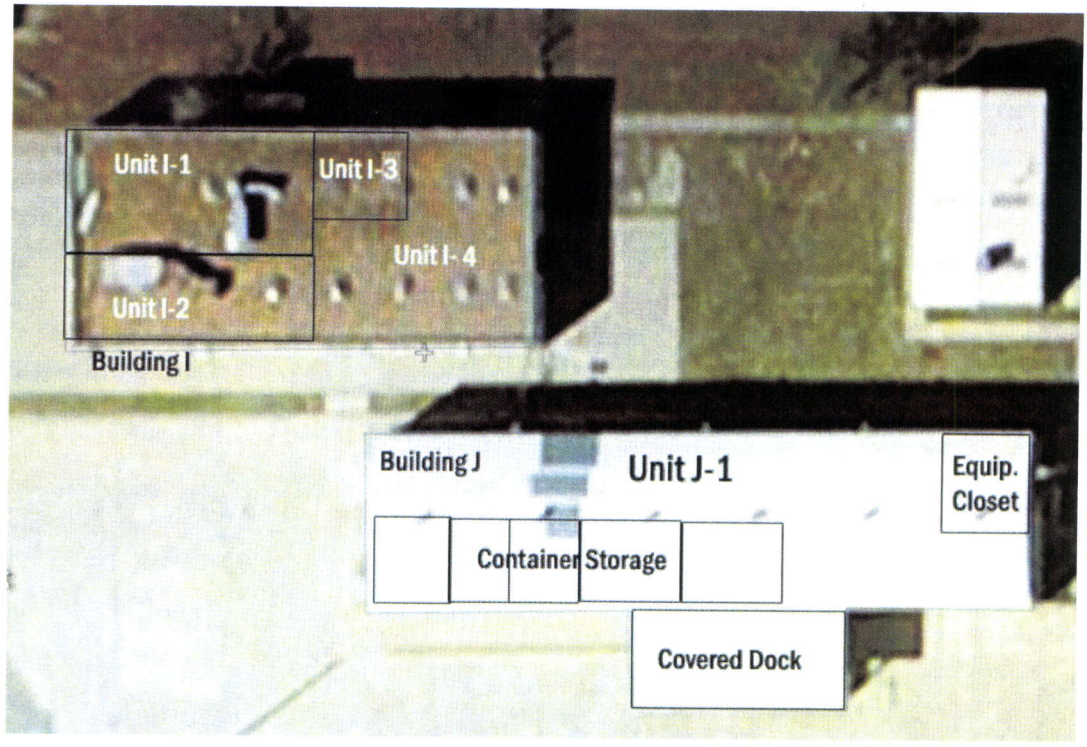


Figure 15. Buildings I and J survey unit layout.

Unit 1 was the main area with access via the large roll-up door on the West face. This unit was 60' x 30' and divided into sub-units 8'x8'. All gamma survey measurements were below 12 μR/hr. No alpha/beta contamination was detected via direct counting and wipe sampling.

Unit 2 was directly adjacent South to Unit1. This unit consisted of three areas with individual berms. This area was also divided into sub-units using an 8'x8' grid spacing. All gamma measurements were at or below background levels and no alpha/beta contamination was detected via direct counting and wipe sampling.

Unit 3 was an enclosed room within the building and appeared to be utilized for volatile material handling. This room was ~ 25' x 20' and was divided into 5' sub units since it was expected to have the highest probability of contamination of the areas within Building I. All gamma exposure rates were at or below background levels and no alpha/beta contamination was detected via direct counting and wipe sampling.

Unit 4 consisted of the remaining areas in the rear (East) portion of the building. This unit was divided into 8' x 8' sub units. All gamma exposure rates were at or below background levels and no alpha/beta contamination was detected via direct counting and wipe sampling.

Building J

Building J consists of empty container storage cells along with a mechanical equipment storage room. All areas were surveyed with 100% coverage for gamma exposure rates. Each storage cell area, storage room and common access open area was direct counted and wiped for alpha/beta detection. All gamma exposure rates were at or below background levels and no alpha/beta contamination was detected via direct counting and wipe sampling.

3.3 Soil Sampling Results

Sample results ranged from 0.62 to 3.60 pCi/g of radium -226. According to KDHE literature, typical background concentrations of radium-226 for this region ranges from 1-4 pCi/g.[2] Based on the median soil sample results, background concentrations of radium-226 were 1.1 pCi/g. Only two locations from the initial sampling sets resulted in radium-226 concentrations statistically significant from background. These two were 2.5 and 3.6 pCi/g and occurred in the section that had previously contained the drain in Survey Unit 1 and the Eastern most point of the vegetative area of Survey Unit 5.

Unit 1: During the third mobilization to the site occurring in October of 2013, an additional eleven locations were sampled in the Unit 1 area. These locations were chosen in order to verify that additional areas did not exist with radium concentrations greater than what had already been determined. Four additional locations were sampled directly over the areas having the highest gamma exposure rate measurements (16 μR/hr). These locations were sampled down to the native clay layer which occurs between 18 and 32" in this area. (The depth of the natural clay layer was verified by the bore-hole drilling contractor who was present on site and who had also conducted drilling in this area.)

Observations of the layers encountered during sampling are described below for each of the additional eleven sampling locations in Unit 1.

1D: Loose soil down to 4" followed by gravel layer ~ 4-6" deep, with uniform black clay/soil throughout the entire remaining depth down to 20" where natural solid clay layer was encountered.

1E: Same as location D

1F: Loose soil first 8" followed by 2" layer of crushed rock and backfill. Bull rock/sand layer for next 3" depth followed by dark clay/soil mix for next 4". Firm solid clay layer encountered at ~18" depth.

1G: Loose soil for top 8" followed by bull-rock/sand layer for next 4". Dark black soil for next 2" followed by clay/soil mix for additional 6". Solid clay layer encountered at 20".

1H: Loose soil for top 10" followed by 2" of crushed rock fill. 2"-Bull rock for next 4-6" followed bay solid clay layer.

1I: 2-4" of bull rock/sand directly under very thin layer of vegetation/soil followed by sandy soil for next 4-6". Clay and loose dark soil for next 6" with layer of black-stained coarse textured soil 2" thick followed directly by solid clay. The lower 12-24" depth was separated into two samples due to the observed strata. Direct survey of black coarse soil did not result in alpha/beta measurements above background.

1J: Loose soil for top 2-3" followed by 2" crush rock layer followed by loose soil/clay for 8-10". Solid clay layer encountered at ~16" depth.

Figure 16. Soil sampling holes showing various strata. Sampling locations are 1G, 1D, 1J (from left to right).

1K: Loose soil down to 4", crushed rock 4-8" followed by clay/soil mix. Solid clay encountered at 12".

1L: Sandy gravel down to 12", black-stained coarse soil 12-16" followed by dark soil/sand mix from 18-24". Dark clay/soil mix down to 30". Solid clay layer encountered at ~30".

1M: Gravel/soil mix down to 12", dark clay/soil mix down to 20". Solid clay layer at 20".

1N: Rocky gravel soil mix down to 8". Road base encountered at ~12". No additional depths dug at this point. A split sample was created for quality control purposes from 1N.

Figure 17. Graphical representation of sampling data relative to EPA guidelines. Although some results are distinguishable above background variance, maximum values are well below EPA criteria.

Unit 5: Additional sampling was also conducted in Survey Unit 5 per the request of KDHE. Three additional sampling locations were selected in a triangular patter around the initial sampling location as described in MARSSIM guidance for bounding a discrete location. Gamma walkover surveys had indicated that the elevated activity portion was limited to the small section of the East portion of the vegetative area. The additional sampling results confirmed that the original sample results represent the highest concentration for this area. All sampling data for radium 226 and 228 are represented in the figure above and listed in the following table.

Table 2. Soil sampling summary data. All values in pCi/g.

Depth:		0-12"		12-24"	Comments
Sample ID	Ra-226 0-12"	Ra-228 0-12"	Ra-226 12-24"	Ra-228 12-24"	
1A	3.60	1.46	1.73	1.03	
1B dup	1.21	0.79	1.01	1.54	lab duplicate
1B			0.76	1.53	
1D	1.13	1.41	1.02	1.45	
1E	1.99	1.03	0.92	1.38	
1F	1.76	1.05	1.02	1.36	
1G	1.10	0.84	1.64	1.26	
1H	1.49	0.78	1.44	1.23	
1I	1.19	0.64	2.06	1.45	12" - 18"
1I*			2.34	0.94	18" - 24"
1J	1.17	0.43	1.16	0.98	
1K	0.87	0.82	1.32	0.99	
1K*			2.00	1.31	24" - 36"
1L	2.83	1.45	3.02	1.14	
1M	1.89	0.89	2.28	0.94	
1N	1.87	0.79			
1N split	1.90	0.90			sample split on site
2	0.96	1.17	0.85	1.74	
3	1.28	1.34	1.62	0.59	
4 dup	0.93	1.09	1.13	1.45	lab duplicate
4	0.91	1.27			
5	2.47	0.79	1.37	1.20	
5B	1.36	0.69	1.42	0.73	
5C	1.69	0.89	1.33	1.21	
5D	1.30	1.37	0.97	0.93	
10	1.67	1.21	1.14	1.53	
13A	0.86	1.01	1.00	0.91	
13B	1.01	1.16	1.22	0.77	
14	0.84	1.07	1.07	1.32	
15 dup	1.01	0.85	0.84	0.95	lab duplicate
15	1.06	1.03			
16	1.07	0.75	1.03	0.96	
17	1.05	1.41	0.91	1.41	
18	1.11	0.97	0.62	0.74	
19	1.01	1.40	0.87	1.18	
21	1.40	1.35			

4.0 Discussion

Survey results obtained by KDHE in 2010 could not be repeated for any of the assumed impacted areas of the facility. The conclusion drawn in 2010 was that the facility contained numerous locations where soil concentrations of radium-226 were assumed to be greater than 5 pCi/g above background based on surface gamma exposure rates of up to 35 μR/hr being measured in isolated locations with an assumed background exposure rate of 10 μR/hr. However, the maximum gamma radiation level detected during any outdoor gamma walkover surveys was only 16 μR/hr.

Measurements a few μR/hr above background (12-14 μR/hr) were obtained in several locations across the site, however soil sampling results did not support an assumption of elevated levels of radium-226 based on these levels. The facility contains a wide variety of soil, gravel and rock types. Different soil, concrete, aggregate and gravel types will contain different levels of naturally occurring radioactive material (NORM) that will affect surveys. In addition, it was determined that the red clay bricks used as construction materials on several buildings on site contained detectable levels of NORM. These construction materials affected any survey results that were obtained directly adjacent to walls or foundation trim containing these bricks.

The only locations where the slightly elevated gamma measurements and initial soil sampling results for radium concentrations indicated potential contamination from past processes were in the Northeastern portion of the site (Unit 1), and a single discrete location in front of the drum storage warehouse (Unit 5). The area in Unit 1 was associated with hazardous drum storage and handling as well as a drain assembly that has been removed and back-filled at some point in the past. Unit 5 is adjacent to the currently ongoing drum management operations. Final sampling locations were chosen in order to bound the locations of elevated concentrations and to better determine average soil concentrations in these areas.

Figure 18. The investigation area in Unit 1: a small grass covered area bound by the concrete drive of Building I to the South, the paved roadway leading to the adjacent property to the West, and the tree-line to the Northeast.

During sampling across the area in Unit 1, it was noted that a backfill layer consisting of gravel and/or 2"-4' bullrock, and stabilizing sand was visible in all sampling locations. This layer varied in depth and thickness and was generally followed by a layer of loose soil and clay mix before reaching the solid clay layer. This material was initially suspected of containing radium contamination. However, based on the descriptions of the strata and the depth profile of the activity concentrations, it is more likely that the activity is contained in the loose soil directly beneath the gravel layer. All locations terminated in a solid clay layer which was assumed to be native clay and was verified as such by a drill crew performing operations on site at significantly deeper depths. All material encountered during sampling activities that was associated with historic excavation and backfill operations was located above the native clay layer

The final sampling results for Unit 1 verify that the elevated concentrations are limited to the small section previously identified. Although several analytical results from the final sampling as well as one from previous sampling for radium were greater than background, as shown in figure 17 the elevated concentrations in these areas were all less than 3 pCi/g above background levels and would not require remediation as a radiologically contaminated area under EPA guidelines. In addition, EPA and KDHE guidelines allow for averaging soil concentrations over $100m^2$ for the upper 15cm depth. The 10-point composite sample was representative of the upper 15 cm depth over approximately $10m^2$ covering the area associated with the historic drain location. Even averaged over this small of an area, the average concentration was found to be consistent with background levels.

Similarly, the additional sampling conducted for Unit 5 also supported that the initial sampling results represent the maximum concentrations to be found in that area and are limited to the single discrete location. The initial results indicated radium-226 concentrations up to 2.47 pCi/g in the upper 12" of soil. The additional sampling triangulated around the initial location resulted in a maximum of 1.69 pCi/g with concentrations decreasing at further depths.

5.0 Conclusion

Initial assumptions for this site were that radium contaminated solvents leaked onto the surface across various locations on-site resulting in widespread contamination significantly above 5 pCi/g. In addition, there was suspicion that material may been discharged through a drainline previously located in the Northeast corner of the property resulting in a large area of concentrated radium activity and that a detailed radiological workplan and safety program as well as a radioactive materials license were needed in order to conduct any remediation operations at this facility.

No data gathered during the characterization of the Clean Harbors facility support those assumptions. Gamma walkover surveys were conducted site-wide, both indoors and outdoors. An action level of 20 μR/hr, which was also used by KDHE during their initial investigation, was only exceeded in the foyer and restroom of Building A and was determined to be due to natural red-clay brick and ceramic tiles containing naturally occurring radioactive material used as construction materials in those areas.

Although no action levels were exceeded, two areas were investigated further; Unit 1 and Unit 5. Based on both initial data and subsequent sampling results, Unit 5 was determined to contain one isolated spot with soil concentrations and gamma exposure rates statistically distinguishable from background, but well below any EPA criteria for radiologic remediation. Likewise, Unit 1 was determined to contain slightly elevated radium concentrations in soil across a small area just Northwest of Building I. However, these concentrations were also limited to a small area and well below remediation guidelines.

All buildings were surveyed for gamma exposure rates followed by static counting for alpha and beta radiation as well as wipe sampling for removable alpha and beta contamination. No instances of elevated exposure rates, not attributed to natural sources, were found and no instances of alpha or beta contamination were detected. All buildings can be released for unrestricted use with regards to radiological conditions.

References:

1. Unified Focused Assessment Report for the Safety Kleen (Wichita) Site (Reid Supply), Wichita, Sedgwick County, Kansas, KDHE I.D. No. # C208770722, Jan. 2010.

2. Naturally Ocurring Radioactive Material, KDHE Radiation Control Program, http://www.kdheks.gov/radiation/download/NORM_Info.pdf, June 2010.

3. MARSSIM – Multi Agency Radiation Survey and Site Investigation Manual, United States EPA, NTIS document number is PB97-117659, Washington DC, June 2001.

Appendix I

SURVEY MAPS WITH GAMMA DATA

CLEAN HARBORS

SOLVENT EXTRACTION SITE

WICHITA, KANSAS

Auxier & Associates, Inc.

Radiological Health, Safety and Environmental Services

A USA Environment, L.P. Company

LEGEND

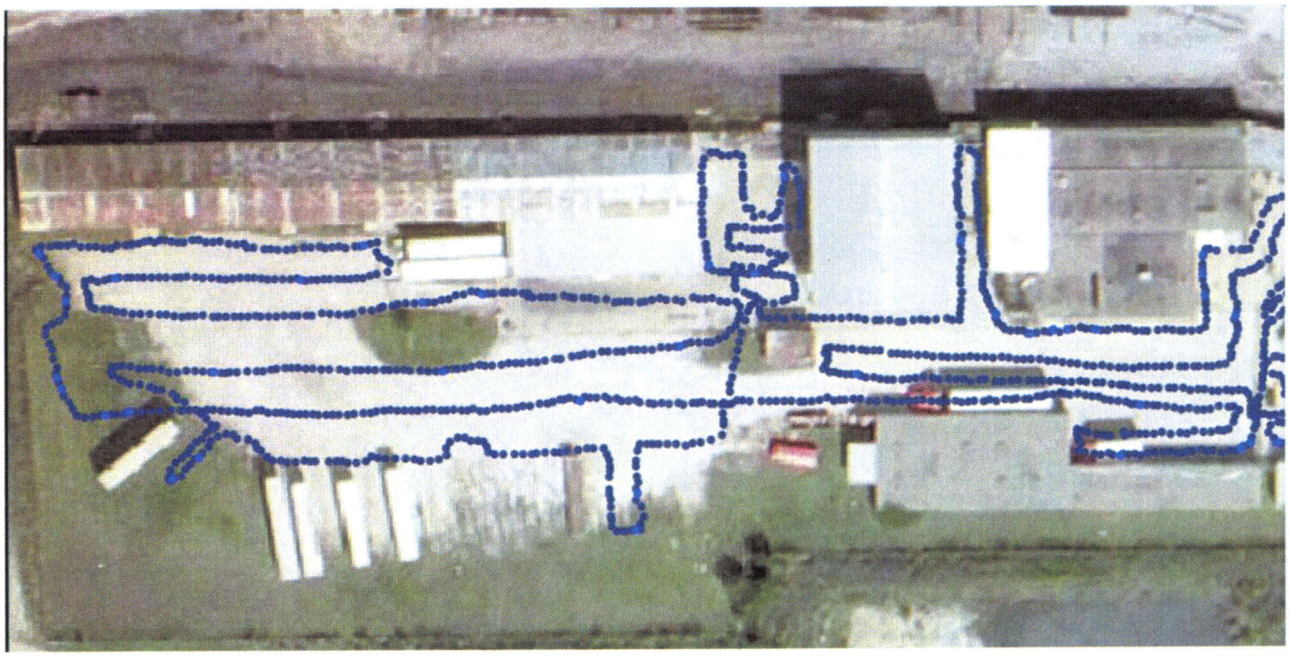
- μR/h <= 10
- 10 < μR/h <= 12
- 12 < μR/h <= 13
- 13 < μR/h <= 15
- 15 < μR/h <= 16
- X Sample Locations

Auxier & Associates
9621 Cogdill Road
Suite 1
Knoxville, TN 37932

Drawn By: Marsha Joseph

Drawing Name: USA/HAR - Clean Harbors Walkover

SHEET NUMBER: Walkover



CLEAN HARBORS
SOLVENT EXTRACTION SITE
WICHITA, KANSAS

USA ENVIRONMENT, L.P.
A Full Service Environmental Company

LEGEND

- µR/h <= 10
- 10 < µR/h <= 12
- 12 < µR/h <= 13
- 13 < µR/h <= 15
- 15 < µR/h <= 16

Drawn By: DON HALTER

Drawing Name: PARKING AREA WALKOVER

SHEET 1 OF 2 | WEST SEGMENT

CLEAN HARBORS
SOLVENT EXTRACTION SITE
WICHITA, KANSAS

USA ENVIRONMENT, L.P.
A Full Service Environmental Company

LEGEND

- μR/h <= 10
- 10 < μR/h <= 12
- 12 < μR/h <= 13
- 13 < μR/h <= 15
- 15 < μR/h <= 16

Drawn By: DON HALTER

Drawing Name: PARKING AREA WALKOVER

SHEET 2 OF 2 | EAST SEGMENT

NaI detector set up combined with GPS unit. Detector probe is housed in the pvc housing. Plastic (1/8" pvc) does not present any significant attenuation to gamma radiation.

Appendix II

ANALYTICAL DATA FOR SOIL SAMPLING

Files included as an electronic version as a separate file on disk.

Appendix III

WIPE SAMPLING RESULTS FOR BUILDINGS

Count Date	Inst.	Det Eff	Units	Count Time (min)	Bkg. Count	
10/25/2013	2929	30%	cpm	1		(Area Bkg.)
					0	(Alpha)
					59	(Beta/Gamma)

PROBE:	MODEL	43-10-1
	S/N	PR-301408
	UNITS	cpm
CAL DUE DATE		3/1/2014

ID	Unit 1 Bldg B	ID	Unit 1 Bldg C	ID	Unit 1 Bldg D	ID	Unit 1 Bldg I	ID	Unit 2 Bldg B	ID	Unit 2 Bldg C	ID	Unit 2 Bldg D	ID	Unit 2 Bldg I
B-2	3A 77B/G	A-1	0A 56B/G	B-2	1A 59B/G	B-2	0A 50B/G	A-3	4A 52B/G	A-1	1A 75B/G	B-2	0A 56B/G	B-3	1A 53B/G
B-3	1A 57B/G	A-2	0A 56B/G	B-3	0A 56B/G	B-3	0A 63B/G	A-6	0A 68B/G	A-2	0A 68B/G	B-3	0A 54B/G	B-4	0A 56B/G
B-4	2A 73B/G	A-3	0A 59B/G	B-4	0A 58B/G	B-4	0A 61B/G	B-2	1A 81B/G	A-3	0A 65B/G	B-4	0A 58B/G	B-5	0A 54B/G
B-5	1A 54B/G	A-4	0A 59B/G	B-5	1A 64B/G	B-5	0A 57B/G	B-3	1A 58B/G	A-4	0A 64B/G	B-5	0A 51B/G	B-6	0A 53B/G
B-6	0A 64B/G	A-5	0A 63B/G	B-6	0A 54B/G	B-6	0A 49B/G	B-4	0A 64B/G	A-5	1A 62B/G	C-5	0A 62B/G	B-7	0A 51B/G
B-7	1A 55B/G	A-6	1A 52B/G	C-6	1A 66B/G	B-7	1A 60B/G	B-5	0A 53B/G	A-6	0A 67B/G	C-4	0A 56B/G	C-7	0A 52B/G
C-7	0A 82B/G	B-6	1A 70B/G	C-5	0A 52B/G	C-7	0A 67B/G	B-6	0A 56B/G	B-6	0A 60B/G	C-3	0A 59B/G	C-6	1A 47B/G
C-8	0A 68B/G	B-5	0A 64B/G	C-4	0A 63B/H	C-6	0A 64B/G	B-7	0A 54B/G	B-5	1A 51B/G	C-2	0A 56B/G	C-5	0A 51B/G
C-9	1A 66B/G	B-4	0A 52B/G	C-3	0A 65B/G	C-5	0A 55B/G	C-8	0A 61B/G	B-4	0A 57B/G	D-2	0A 54B/G	C-4	0A 50B/G
C-4	2A 64B/G	B-3	1A 73B/G	C-2	1A 61B/G	C-4	0A 53B/G	C-7	0A 59B/G	B-3	0A 62B/G	D-3	0A 58B/G	C-3	1A 51B/G
C-3	0A 54B/G	B-2	0A 66B/G	D-2	0A 61B/G	C-3	1A 59B/G	C-6	0A 55B/G	B-2	1A 57B/G	D-4	0A 56B/G	C-2	0A 53B/G
D-2	0A 49B/G	B-1	0A 63B/G	D-3	1A 48B/G	C-2	0A 62B/G	C-5	0A 56B/G	B-1	1A 64B/G	D-5	0A 57B/G	D-2	0A 54B/G
D-3	1A 57B/G	C-1	1A 53B/G	D-4	0A 69B/G	D-2	0A 63B/G	C-4	0A 60B/G	C-1	0A 61B/G	E-5	0A 52B/G	D-3	0A 55B/G
D-4	0A 52B/G	C-2	1A 74B/G	D-5	0A 67B/G	D-3	0A 60B/G	C-3	1A 61B/G	C-2	0A 59B/G	E-4	0A 55B/G	D-4	0A 54B/G
D-5	0A 57B/G	C-3	0A 68B/G	D-6	0A 71B/G	D-4	0A 57B/G	C-2	0A 57B/G	C-3	0A 60B/G	E-3	1A 62B/G	D-5	0A 51B/G
D-6	1A 61B/G	C-4	0A 49B/G	E-6	0A 46B/G	D-5	0A 56B/G	D-2	2A 54B/G	C-4	0A 67B/G	E-2	0A 51B/G	D-6	0A 56B/G
D-7	0A 63B/G	C-5	3A 66B/G	E-5	0A 64B/G	D-6	0A 63B/G	D-3	1A 56B/G	C-5	1A 64B/G	F-2	0A 55B/G	D-7	0A 52B/G
D-8	0A 64B/G			E-4	0A 73B/G	D-7	1A 61B/G	D-4	0A 61B/G	C-6	0A 66B/G	F-3	0A 50B/G	E-7	0A 56B/G
E-7	0A 55B/G			E-3	0A 51B/G	C-8	2A 56B/G	D-5	0A 64B/G			F-4	0A 53B/G	E-6	0A 66B/G
E-3	0A 70B/G			E-2	0A 73B/G	E-6	0A 63B/G	D-6	0A 58B/G			F-5	0A 52B/G	E-5	0A 57B/G
A-4	2A 65B/G			E-1	1A 73B/G	A-5	0A 58B/G	D-7	1A 49B/G			A-3	0A 55B/G	E-4	0A 53B/G
A-6	1A 61B/G			F-5	4A 67B/G	E-3	0A 55B/G	E-7	0A 62B/G			B-1	0A 54B/G	E-3	0A 54B/G
C-1	0A 49B/G			E-7	1A 58B/G	A-2	0A 58B/G	E-4	1A 64B/G			F-1	0A 58B/G	E-2	0A 52B/G
C-8	0A 62B/G			C-7	1A 63B/G	D-1	0A 61B/G	E-2	0A 64B/G			F-6	0A 55B/G	F-2	0A 54B/G
				A-5	0A 61B/G									F-3	0A 56B/G
														F-4	0A 54B/G
														F-5	1A 53B/G
														F-6	0A 56B/G
														F-7	0A 53B/G
														G-7	2A 70B/G
														G-6	4A 57B/G
														G-5	0A 45B/G
														G-4	1A 57B/G
														G-3	0A 54B/G
														G-2	0A 58B/G
														H-3	0A 47B/G
														H-5	0A 50B/G
														E-1	1A 57B/G
														C-1	0A 54B/G
														A-4	0A 52B/G
														A-6	0A 55B/G

Project Name:

Location: Clean Harbors - Wichita, KS

Date: 10/26/13

Surveyor/Recorder: Jeff Donohue

Count Date	Inst.	Det Eff	Units	Count Time (min)	Bkg. Count
10/26/2013	2929	30%	cpm	1	
					1
					54

METER:	MODEL	2929
	S/N	271407
PROBE:	MODEL	43-10-1
PROBE:	MODEL	43-10-1
	S/N	PR-301408
	UNITS	cpm
	CAL DUE DATE	3/1/2014

ID	Unit 3 BLDG C	ID	Unit 3 BLDG D	ID	Unit 3 BLDG I	ID	Unit 4 BLDG B	ID	Unit 4 BLDG C	ID	Unit 4 BLDG D	ID	Unit 4 BLDG I		ADMIN BLDG
A-1	0A 54B/G	B-2	0A 56B/G	B-2	0A 62B/G	B-1	0A 56B/G	A-1	0A 51B/G	B-2	0A 62B/G	A-2	0A 54B/G	A-1	0A 56B/G
A-2	1A 56B/G	B-3	0A 62B/G	B-3	0A 58B/G	B-2	0A 52B/G	A-2	0A 55B/G	B-3	0A 58B/G	A-3	0A 52B/G	A-2	0A 49B/G
A-3	0A 56B/G	B-4	0A 54B/G	B-4	1A 54B/G	B-3	0A 55B/G	A-3	0A 57B/G	B-4	1A 68B/G	A-4	0A 56B/G	A-3	0A 54B/G
A-4	0A 54B/G	B-5	0A 58B/G	B-5	0A 60B/G	B-4	0A 56B/G	A-4	0A 54B/G	B-5	0A 52B/G	A-5	0A 54B/G	A-4	0A 56B/G
A-5	0A 54B/G	B-6	0A 52B/G	B-6	0A 57B/G	B-5	0A 51B/G	A-5	0A 56B/G	B-6	0A 57B/G	A-6	0A 59B/G	1	0A 55B/G
A-6	0A 57B/G	B-7	0A 57B/G	C-6	0A 58B/G	B-6	0A 54B/G	A-6	0A 54B/G	B-7	0A 51B/G	B-6	0A 57B/G	2	0A 54B/G
A-6	0A 55B/G	C-7	1A 55B/G	C-5	0A 54B/G	C-6	0A 51B/G	B-6	0A 61B/G	B-8	0A 48B/G	B-5	0A 61B/G	3	0A 59B/G
B-6	0A 52B/G	C-6	0A 54B/G	C-4	0A 56B/G	C-5	0A 50B/G	B-5	0A 52B/G	B-9	0A 52B/G	B-4	1A 68B/G	4	0A 54B/G
B-5	0A 54B/G	C-5	0A 56B/G	C-3	0A 69B/G	C-4	0A 50B/G	B-4	0A 54B/G	B-10	0A 53B/G	B-3	0A 60B/G		
B-4	0A 56B/G	C-4	0A 54B/G	C-2	0A 55B/G	C-3	0A 52B/G	B-3	0A 56B/G	C-10	0A 56B/G	B-2	0A 58B/G		
B-3	0A 71B/G	C-3	1A 57B/G	D-2	0A 52B/G	C-2	0A 61B/G	B-2	0A 57B/G	C-9	0A 54B/G	C-2	0A 52B/G		
B-2	0A 55B/G	C-2	0A 52B/G	D-3	0A 53B/G	C-1	0A 53B/G	B-1	0A 50B/G	C-8	0A 59B/G	C-3	0A 55B/G		
B-1	0A 61B/G	A-2	0A 55B/G	D-4	0A 57B/G	D-1	0A 60B/G	C-1	0A 56B/G	C-7	0A 52B/G	C-4	0A 54B/G		
C-1	0A 50B/G	D-4	0A 54B/G	D-5	0A 55B/G	D-2	0A 55B/G	C-2	0A 51B/G	C-6	0A 56B/G	C-5	0A 61B/G		
C-2	1A 52B/G	A-6	0A 59B/G	D-6	1A 54B/G	D-3	1A 58B/G	C-3	0A 54B/G	C-5	1A 53B/G	C-6	2A 54B/G		
C-3	0A 52B/G	D-6	0A 57B/G	D-7	0A 57B/G	D-4	0A 54B/G	C-4	0A 55B/G	C-4	0A 51B/G	D-6	0A 56B/G		
C-4	0A 57B/G	C-8	1A 56B/G	A-5	0A 52B/G	D-5	0A 51B/G	C-5	0A 52B/G	C-3	0A 57B/G	D-5	0A 58B/G		
C-5	0A 56B/G			A-3	0A 56B/G	D-6	0A 62B/G	C-6	0A 59B/G	C-2	0A 56B/G	D-4	0A 51B/G		
C-6	0A 51B/G			D-1	0A 59B/G	E-6	0A 68B/G			D-2	0A 53B/G	D-3	0A 54B/G		
						E-5	0A 53B/G			D-3	0A 53B/G	D-2	0A 59B/G		
						E-4	0A 55B/G			D-4	0A 61B/G	D-1	0A 60B/G		
						E-3	0A 49B/G			D-5	0A 54B/G	A-1	0A 54B/G		
						E-2	0A 56B/G			D-6	0A 58B/G	E-5	0A 58B/G		
						E-1	0A 53B/G			D-7	0A 57B/G	E-3	1A 56B/G		
						F-1	0A 58B/G			D-8	0A 51B/G				
						F-2	0A 53B/G			D-9	0A 61B/G				
						F-3	0A 67B/G			D-10	0A 57B/G				
						F-4	1A 58B/G			E-10	0A 59B/G				
						F-5	0A 54B/G			E-9	0A 54B/G				
						F-6	0A 51B/G			E-8	0A 56B/G				
						G-6	0A 54B/G			E-7	0A 64B/G				
						G-5	0A 56B/G			E-6	0A 59B/G				
						G-4	0A 58B/G			E-5	0A 51B/G				
						G-3	0A 59B/G			E-4	0A 54B/G				
						G-2	0A 57B/G			E-3	0A 54B/G				
						G-1	0A 55B/G			E-2	0A 59B/G				
						H-1	0A 56B/G			F-2	0A 56B/G				
						H-6	0A 55B/G			F-5	0A 61B/G				
						F-7	0A 51B/G			D-11	0A 54B/G				
						A-6	0A 53B/G			A-4	0A 56B/G				
						A-2	0A 57B/G								
						C-7	0A 52B/G								

Project Name:

Location: Apartment

Date: 10/26/13

Surveyor/Recorder: Jeff Donohue

Count Date	Inst.	Det Eff	Units	Count Time (min)	Bkg. Count
10/26/2013	2929	30%	cpm	1	
					1
					54

METER:	MODEL	2929
	S/N	271407
PROBE:	MODEL	43-10-1
PROBE:	MODEL	43-10-1
	S/N	PR-301408
	UNITS	cpm
	CAL DUE DATE	3/1/2014

ID	Unit 5 BLDG D	ID	Unit 5 BLDG C	ID	J BLDG	ID	PROCESS AERA	ID	D U6 U7	ID	D 8,9,10
B-2	0A 54B/G	A-1	1A 57B/G	J-1	0A 54B/G	1	0A 59B/G	U6-1	0A 54B/G	D101	0A 52B/G
B-3	0A 56B/G	A-2	0A 68B/G	J-2	0A 58B/G	2	0A 57B/G	U6-2	0A 65B/G	D102	0A 56B/G
B-4	0A 52B/G	A-3	0A 70B/G	J-3	0A 59B/G	3	0A 58B/G	U6-3	0A 52B/G	D81	0A 58B/G
B-5	0A 56B/G	A-4	0A 58B/G	J-4	2A 60B/G	4	0A 59B/G	U6-4	0A 54B/G	D82	0A 55B/G
B-6	0A 57B/G	A-5	0A 61B/G	J-5	0A 56B/G	5	0A 57B/G	U6-5	1A 56B/G	D83	0A 53B/G
C-6	0A 51B/G	A-6	0A 64B/G	J-6	0A 52B/G	6	0A 57B/G	U7-1	0A 54B/G	D91	0A 57B/G
C-5	0A 55B/G	B-6	0A 55B/G	J-7	0A 54B/G	7	0A 56B/G	U7-2	0A 58B/G	D92	0A 46B/G
C-4	0A 53B/G	B-5	0A 53B/G	J-8	0A 53B/G	8	0A 58B/G	U7-3	0A 67B/G	D93	0A 57B/G
C-3	0A 53B/G	B-4	0A 51B/G	J-9	0A 59B/G	9	0A 57B/G	U7-4	0A 69B/G	D94	0A 52B/G
C-2	0A 57B/G	B-3	0A 53B/G	J-10	0A 55B/G	10	0A 61B/G	U7-5	0A 56B/G	D95	0A 54B/G
D-2	1A 61B/G	B-2	0A 52B/G	J-11	0A 54B/G	11	0A 58B/G				
D-3	0A 56B/G	B-1	0A 54B/G	J-12	0A 53B/G	13	0A 56B/G				
D-4	0A 51B/G	C-1	0A 58B/G	J-13	0A 58B/G	14	0A 55B/G				
D-5	0A 48B/G	C-2	0A 61B/G	J-14	0A 53B/G	15	0A 59B/G				
D-6	0A 59B/G	C-3	0A 59B/G	J-15	1A 59B/G	16	1A 62B/G				
E-6	2A 52B/G	C-4	0A 53B/G	J-16	0A 61B/G	17	0A 53B/G				
E-5	0A 53B/G			J-17	0A 58B/G	18	0A 59B/G				
E-4	0A 59B/G			J-18	0A 56B/G	19	0A 54B/G				
E-3	0A 57B/G			J-19	0A 53B/G	20	0A 56B/G				
E-2	0A 54B/G			J-20	0A 51B/G	21	0A 57B/G				
E-1	1A 53B/G			J-21	0A 57B/G	22	0A 52B/G				
B-1	0A 52B/G			J-22	0A 53B/G	23	0A 58B/G				
F-5	0A 55B/G					24	0A 59B/G				
B-7	0A 54B/G					25	0A 56B/G				
A-4	0A 58B/G					26	0A 58B/G				
						27	0A 55B/G				
						28	0A 56B/G				
						29	0A 64B/G				
						30	1A 54B/G				
						31	0A 59B/G				
						32	0A 52B/G				
						33	0A 58B/G				
						34	0A 57B/G				
						35	0A 53B/G				

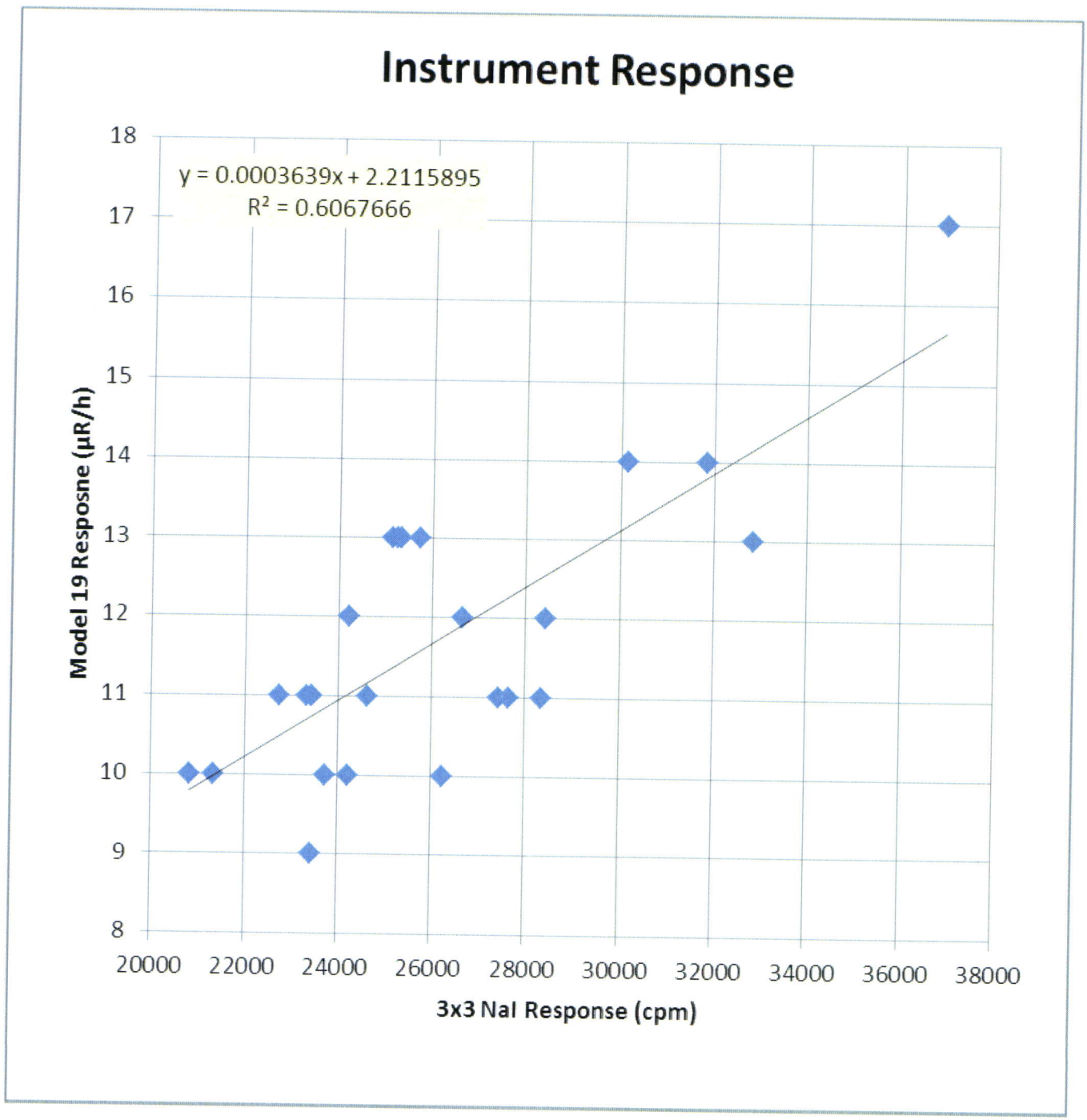
Appendix IV

EXPOSURE RATE TO CPM CORRELATION DATA

Site Specific Paired Instrument Responses		
Sample ID	**uR/h**	**cpm**
5	13	25730
4	10	26230
14	11	27630
15	13	25230
16	12	26630
17	12	28430
18	13	32830
19	14	30130
21	14	31830
13B	11	28330
13A	11	27430
3	11	23430
2	10	24230
1A	9	23430
1B	17	36930
composite 1	11	23430
composite 2	11	22730
composite 3	11	24630
composite 4	12	24230
composite 5	13	25330
composite 6	10	20830
composite 7	10	23730
composite 8	11	23330
composite 9	10	21330
composite 10	13	25130

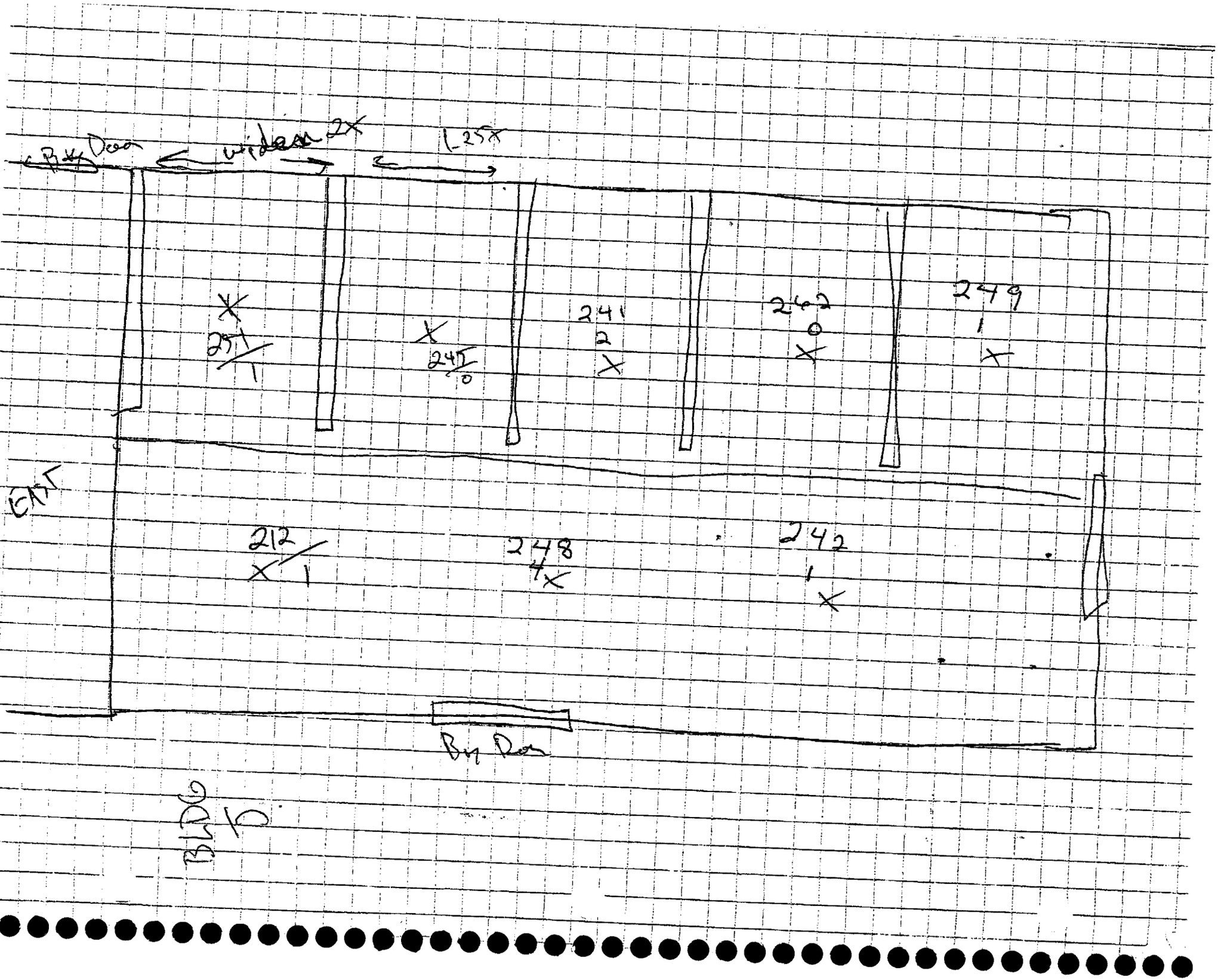
uR/h = 0.000364 uR/h/cpm x (cpm) + 2.212 uR/h
r2 = 0.49

Key:		
	0.000364	2.212
cpm		uR/h
22000	10.22	10
27000	12.04	12
30000	13.13	13
36000	15.32	15
39000	16.41	16

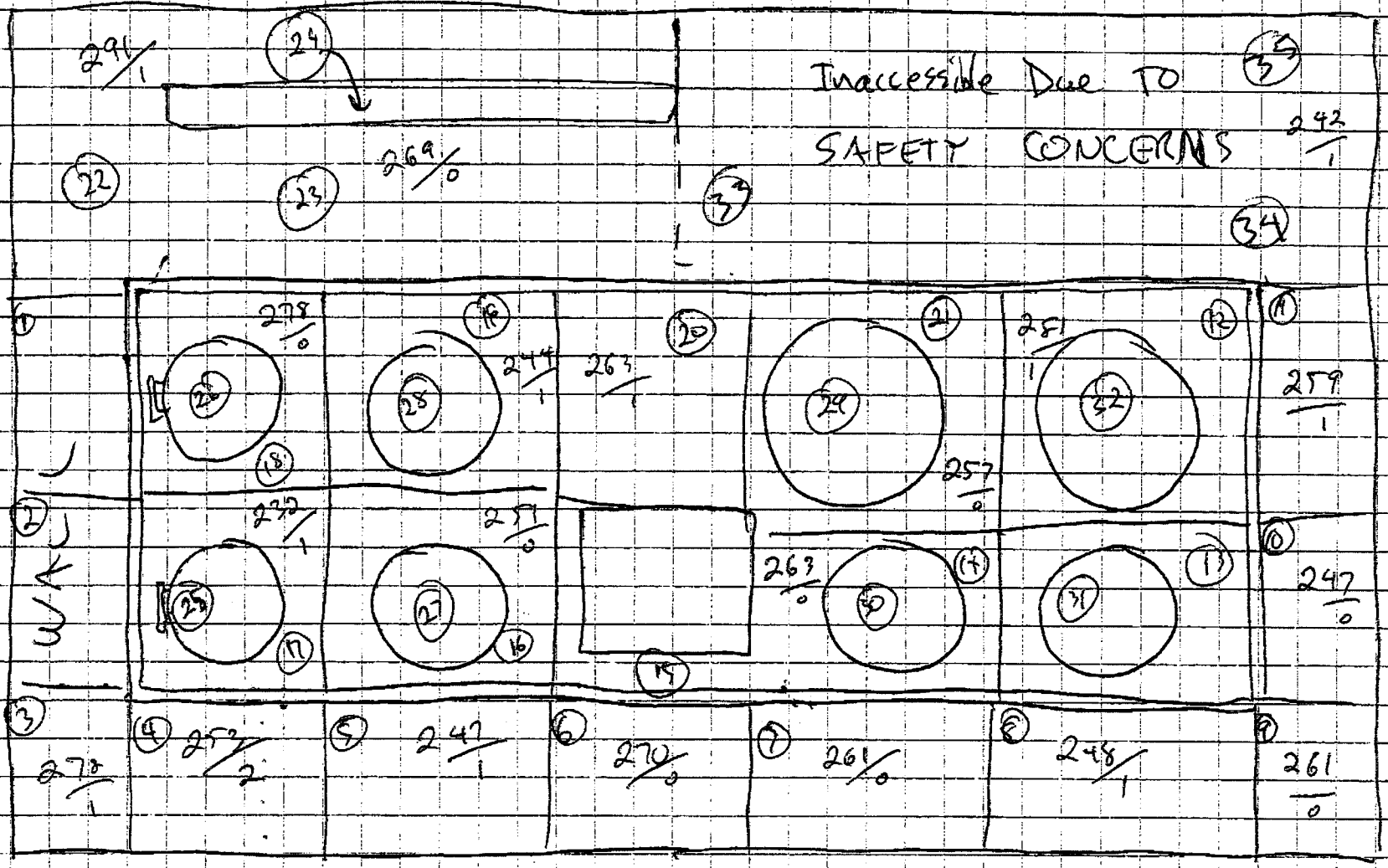

Instrument Response
y = 0.0003639x + 2.2115895
R² = 0.6067666
Model 19 Resposne (µR/h)
3x3 NaI Response (cpm)
18
17
16
15
14
13
12
11
10
9
8
20000
22000
24000
26000
28000
30000
32000
34000
36000
38000

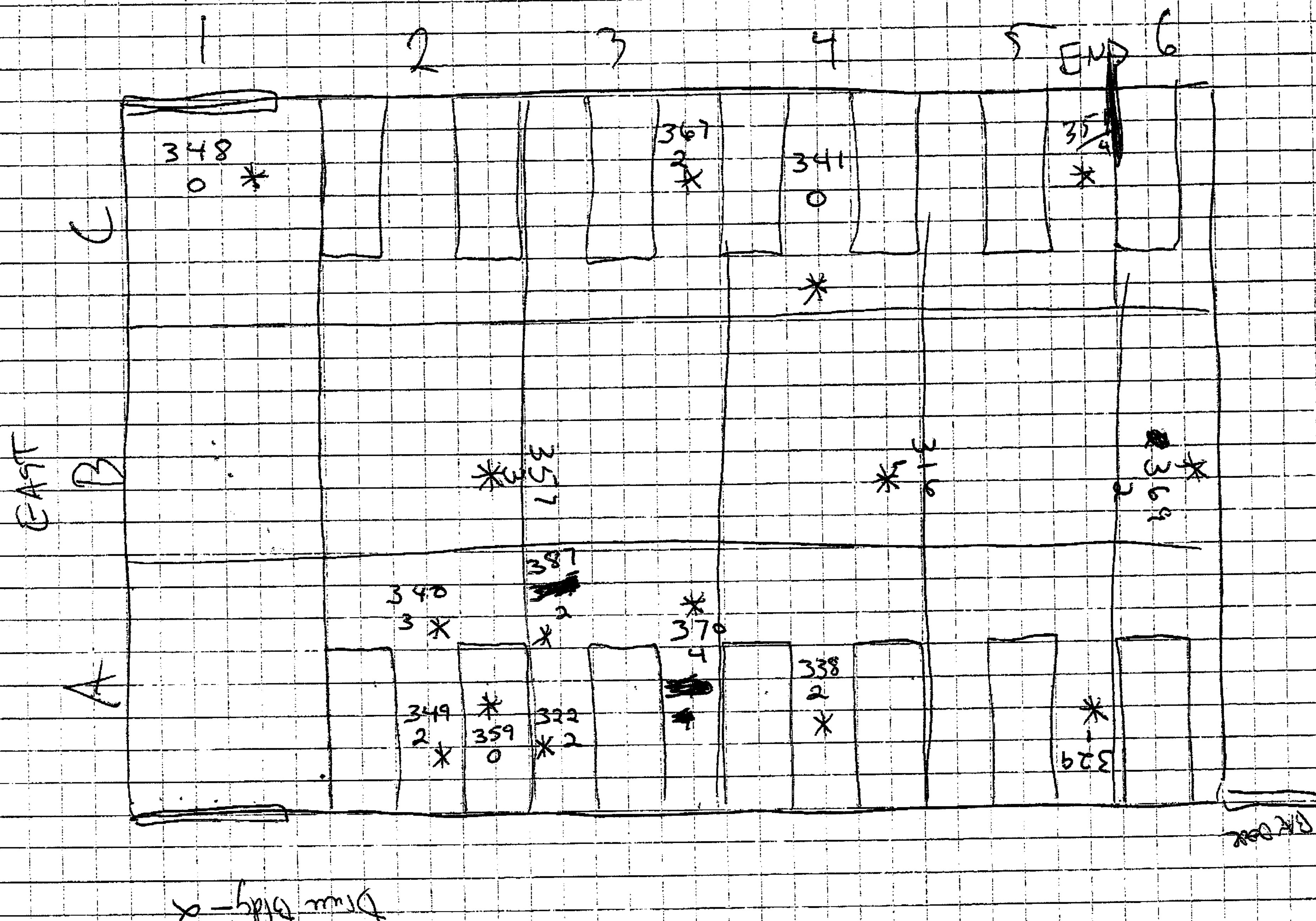
Appendix V

FIELD NOTES SURVEY MAPS AND DATA


Bk Door
widen 2X
L 25X
X
251
1
X
245
0
241
2
X
242
0
X
249
1
X
EXT
212
X
1
248
4X
242
1
X
Bk Door
BLDG

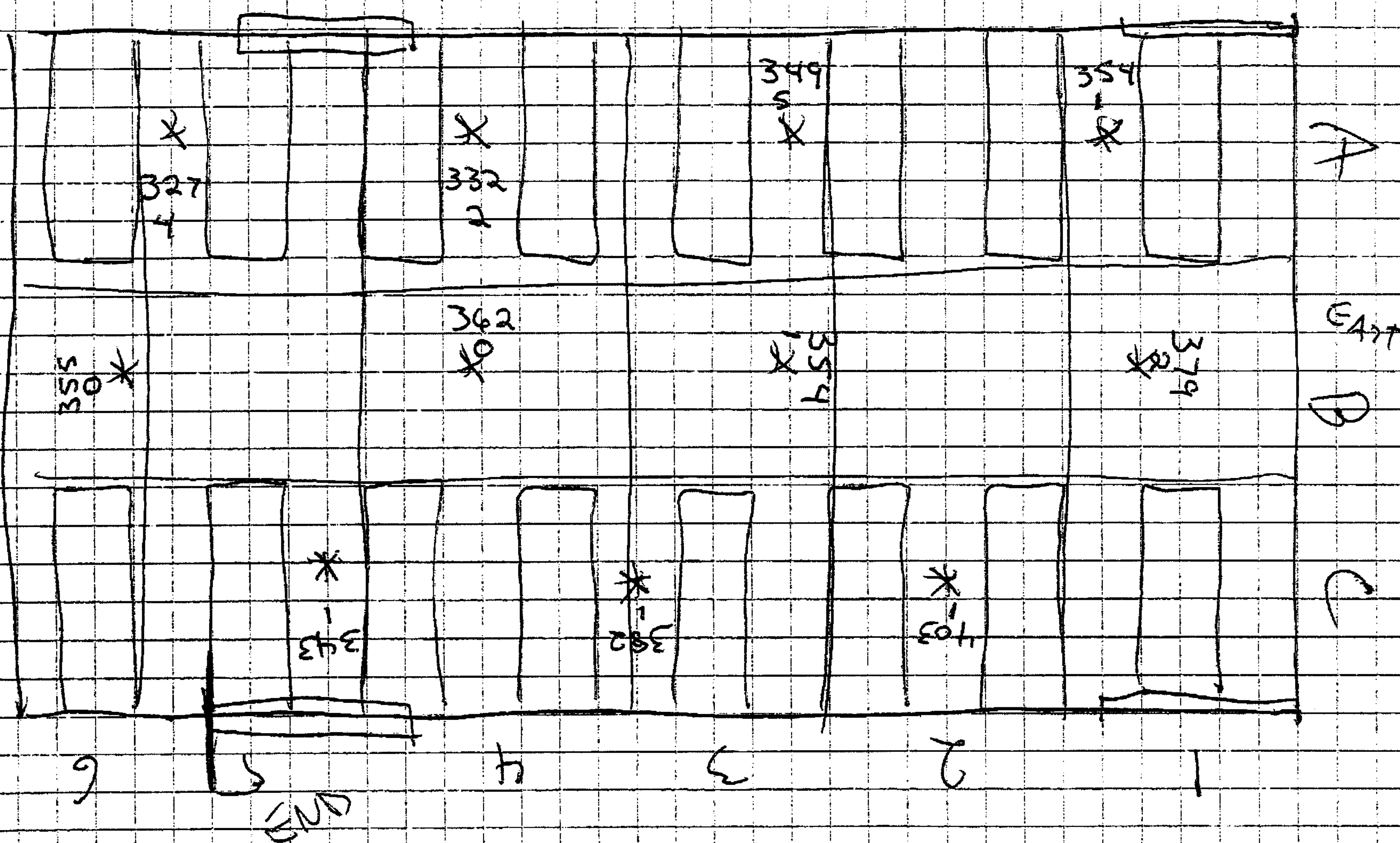
Process Area





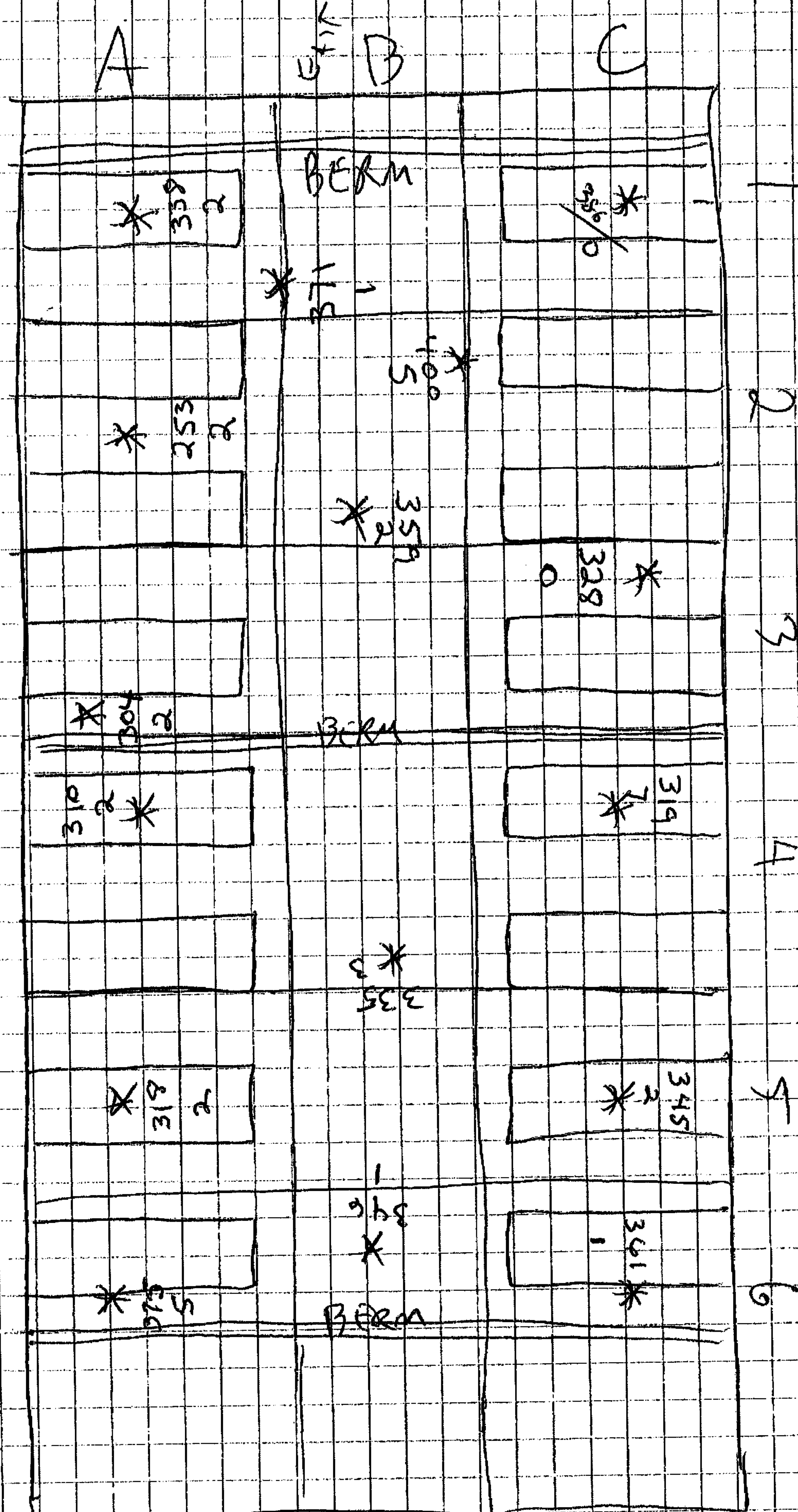
1
2
3
4
5
END
6
C
B
A
EAST
348
0
367
2
341
0
35
4
357
316
365
387
2
340
3
370
4
338
2
349
2
359
0
322
2
329
Drum Bldg-2

Drive Bldg – 3

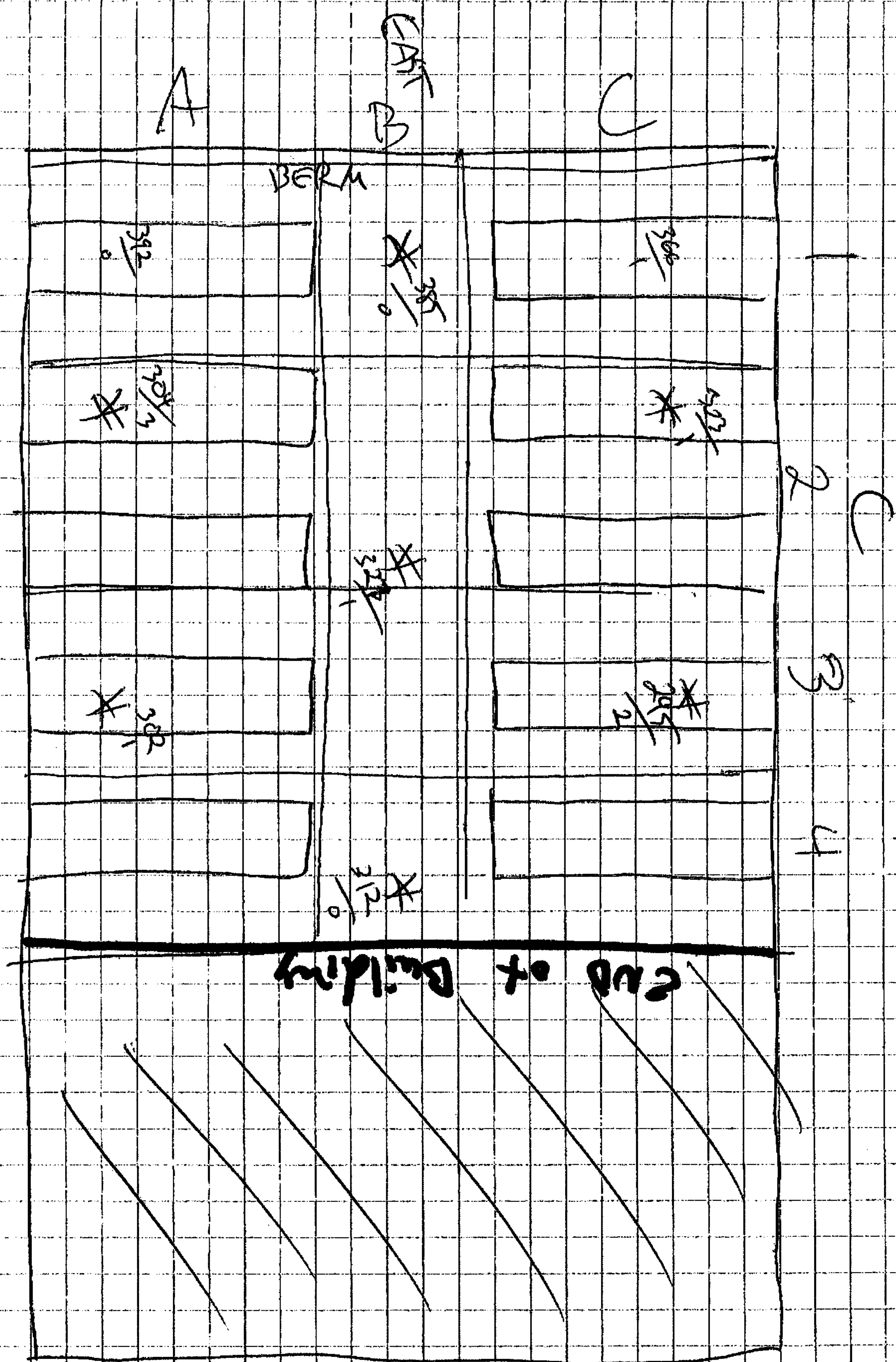


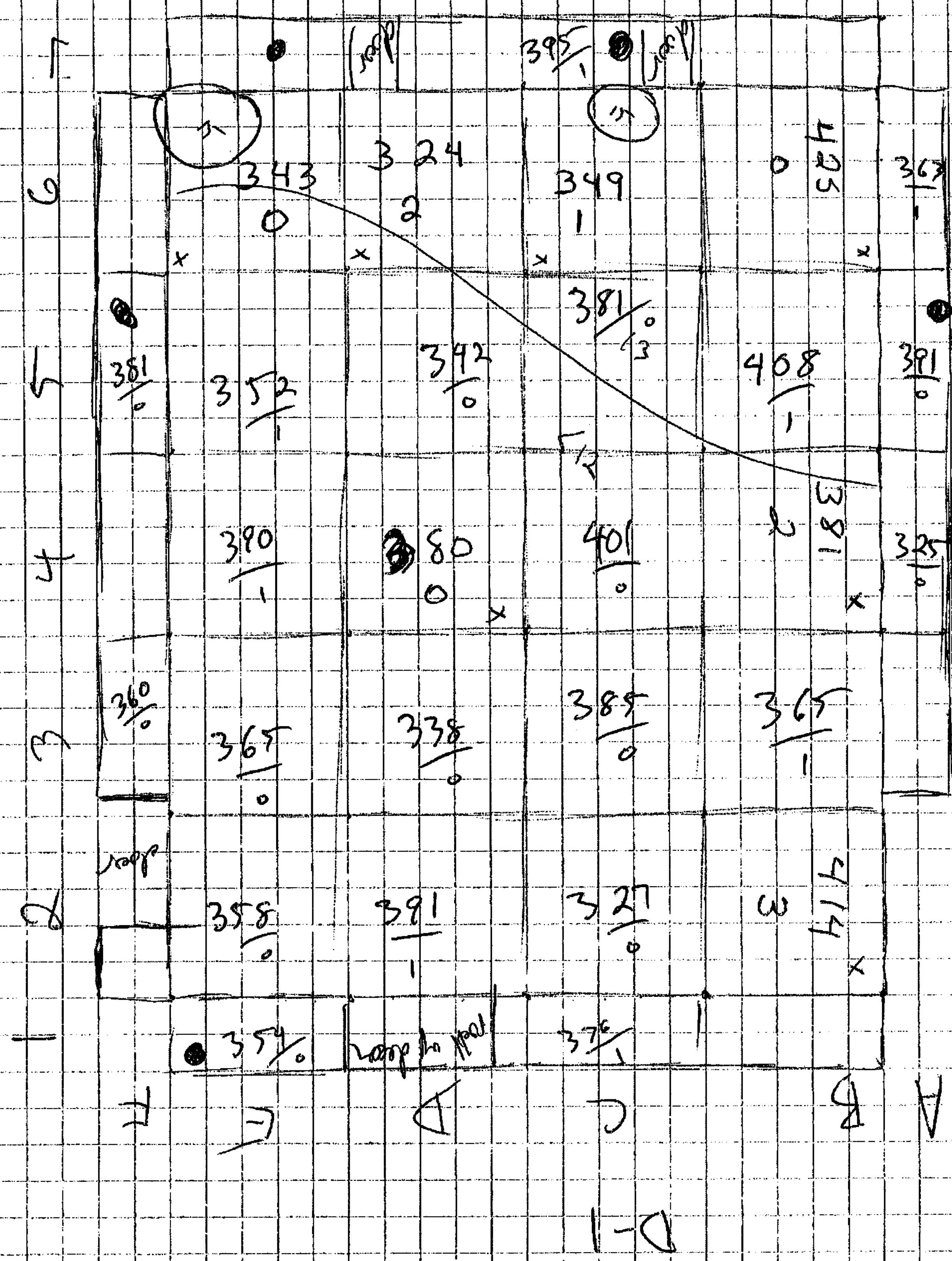
A
B
C
East
1
2
3
4
5
6
END
354 1
379 2
349 5
354 1
403 1
382 1
332 2
362 0
343 1
327 4
350 5

Drum Bldg – 4

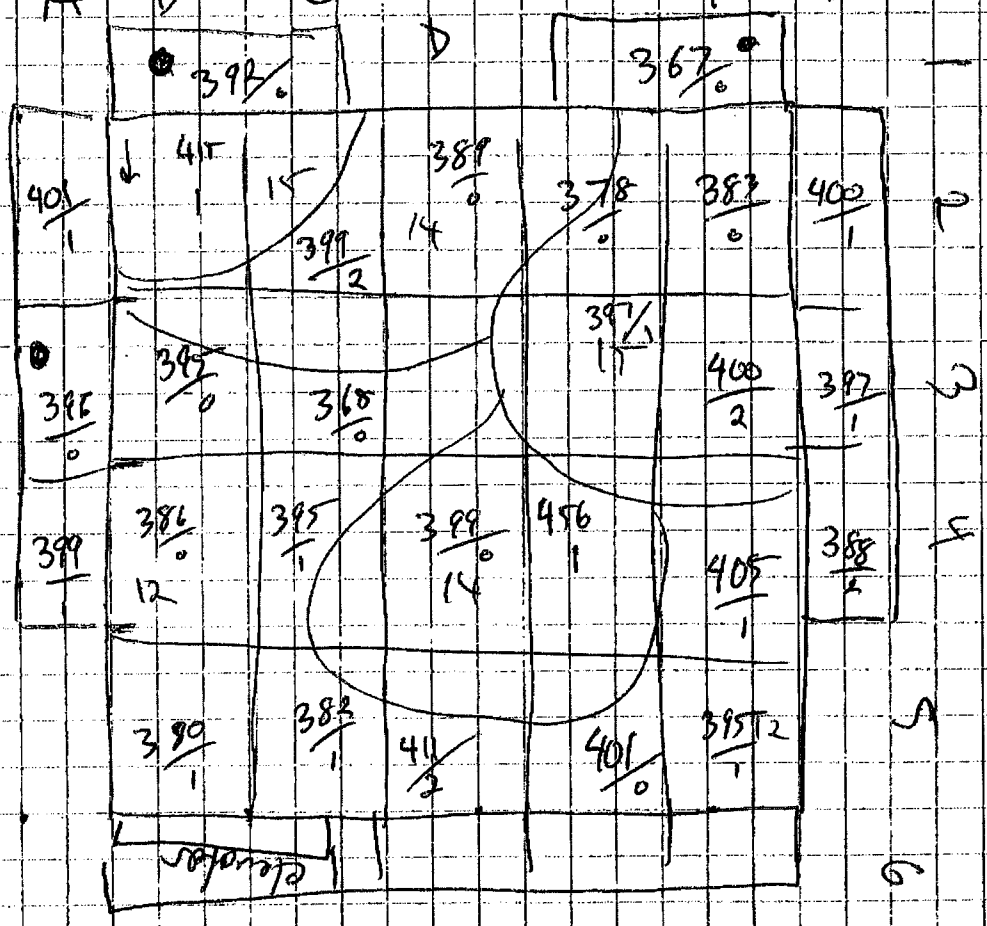

A
B
C
BERM
359
2
356
0
371
400
5
253
2
357
2
328
0
304
2
BERM
312
2
319
7
335
3
318
2
345
2
346
1
361
1
315
5
BERM
1
2
3
4
5
6

Drum Burial – 5

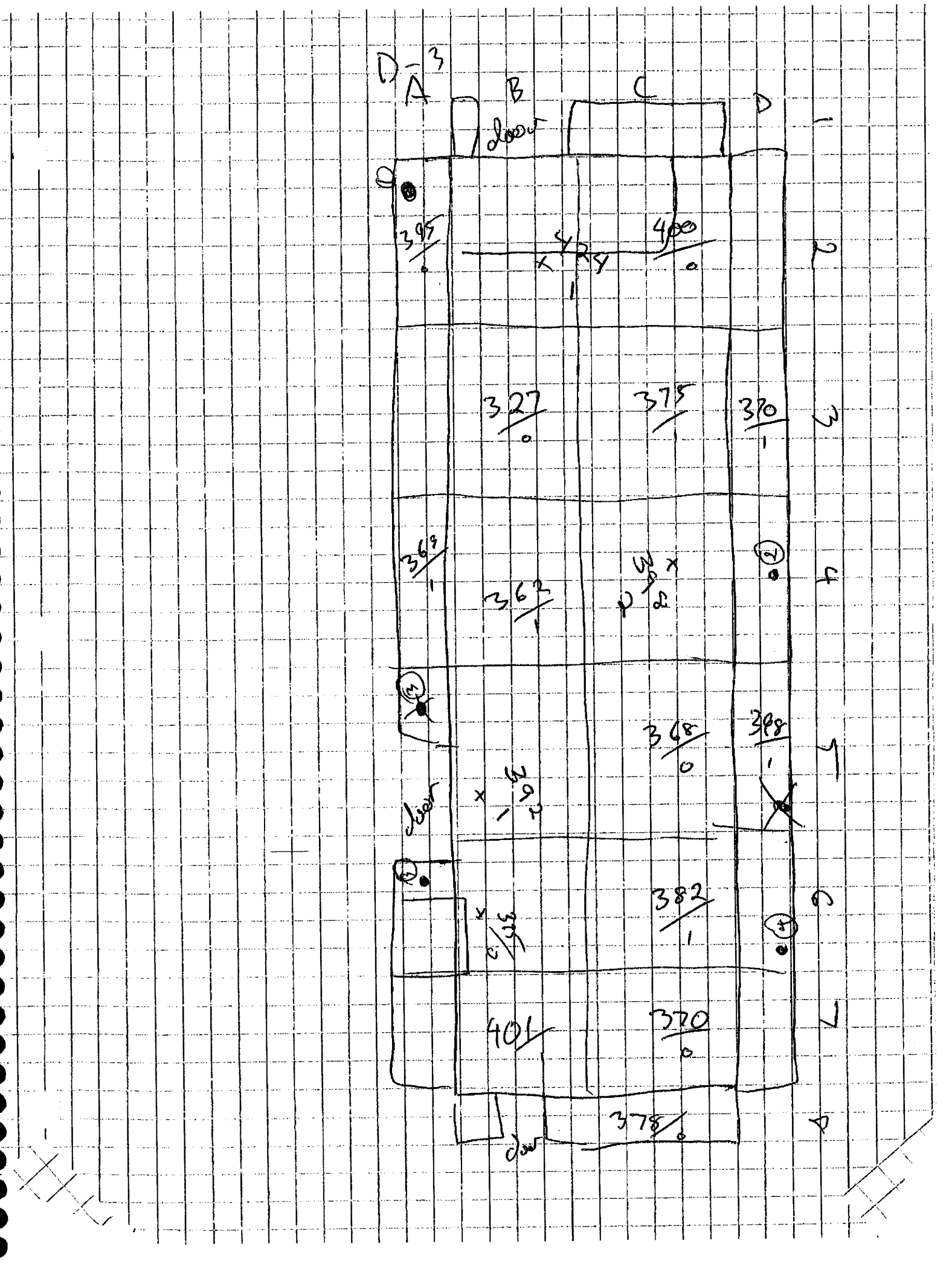


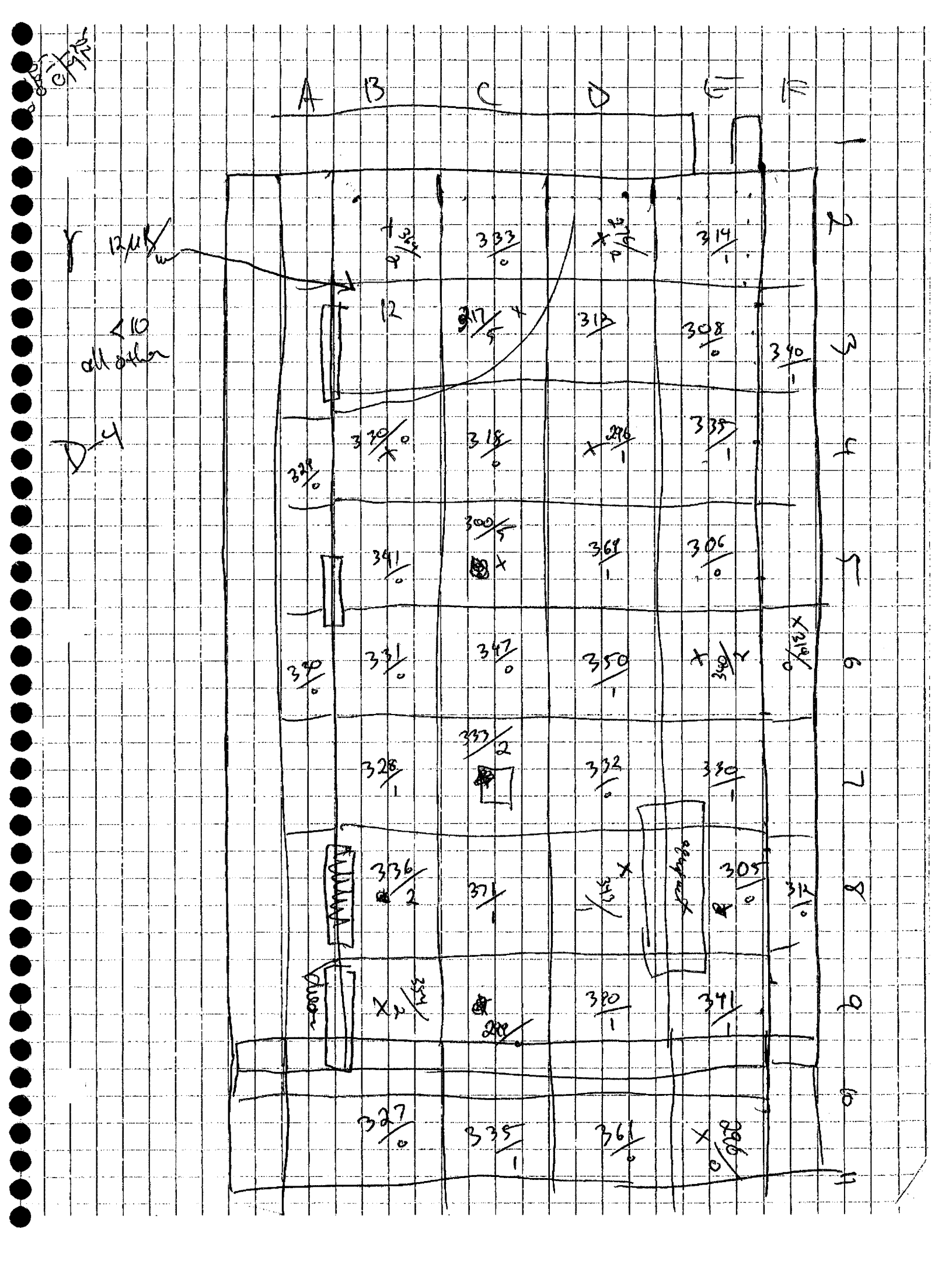


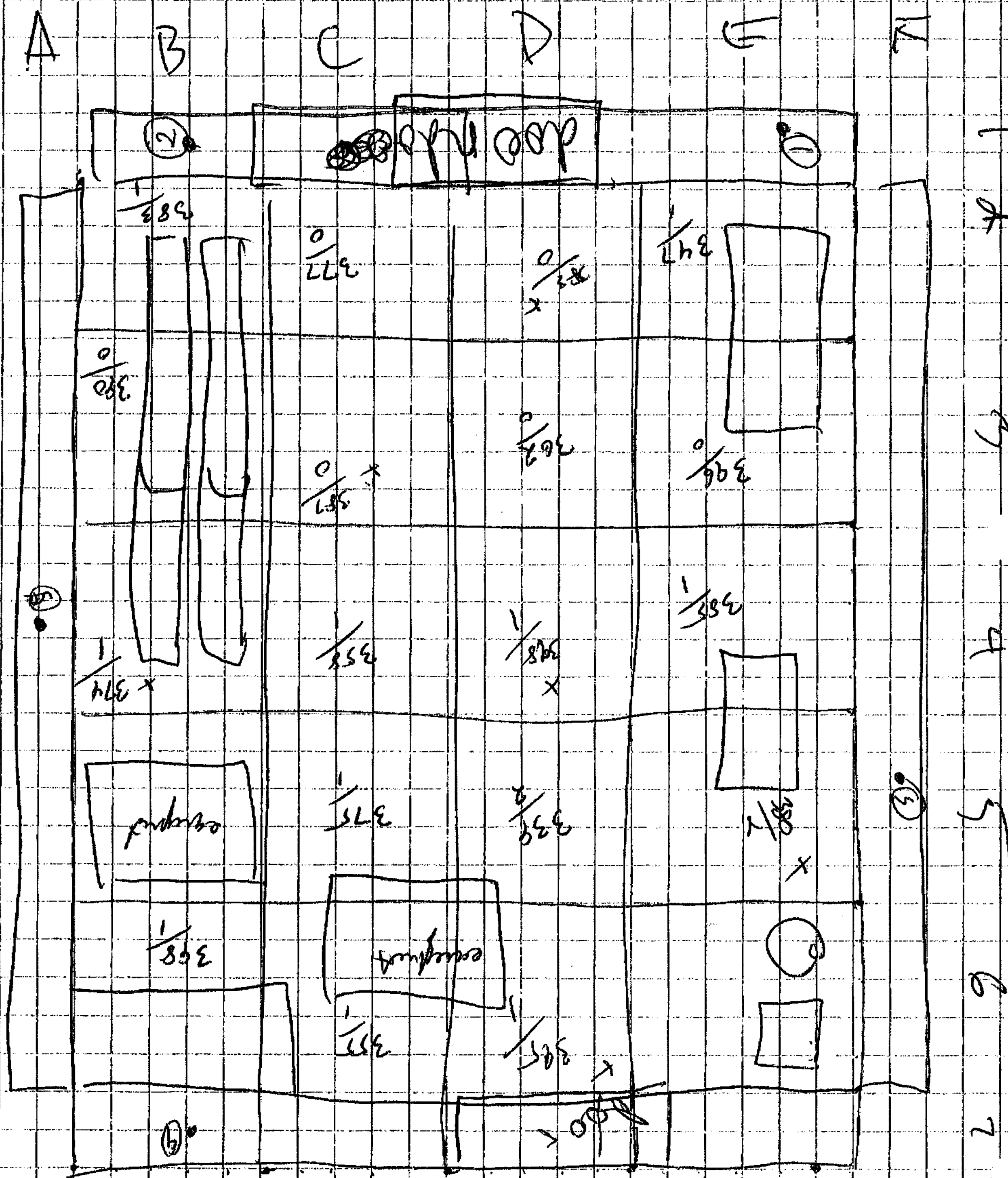
395/1
343 0
324 2
349 1
381/0
381/0
352/1
342/0
381/0 3
408/1
391/0
390/1
380 0
401/0
325/0
360/0
365/0
338/0
385/0
365/1
ramp
358/0
391 1
327/0
354/0
ramp to pool
376/1



- 15 μR/hr upper right corner along wall in left corner
- 14 μR/hr in courtyard
- all others < 12 μR/hr


A
B
C
D
door
395
400
327
375
370
368
363
368
388
door
382
401
370
375
door

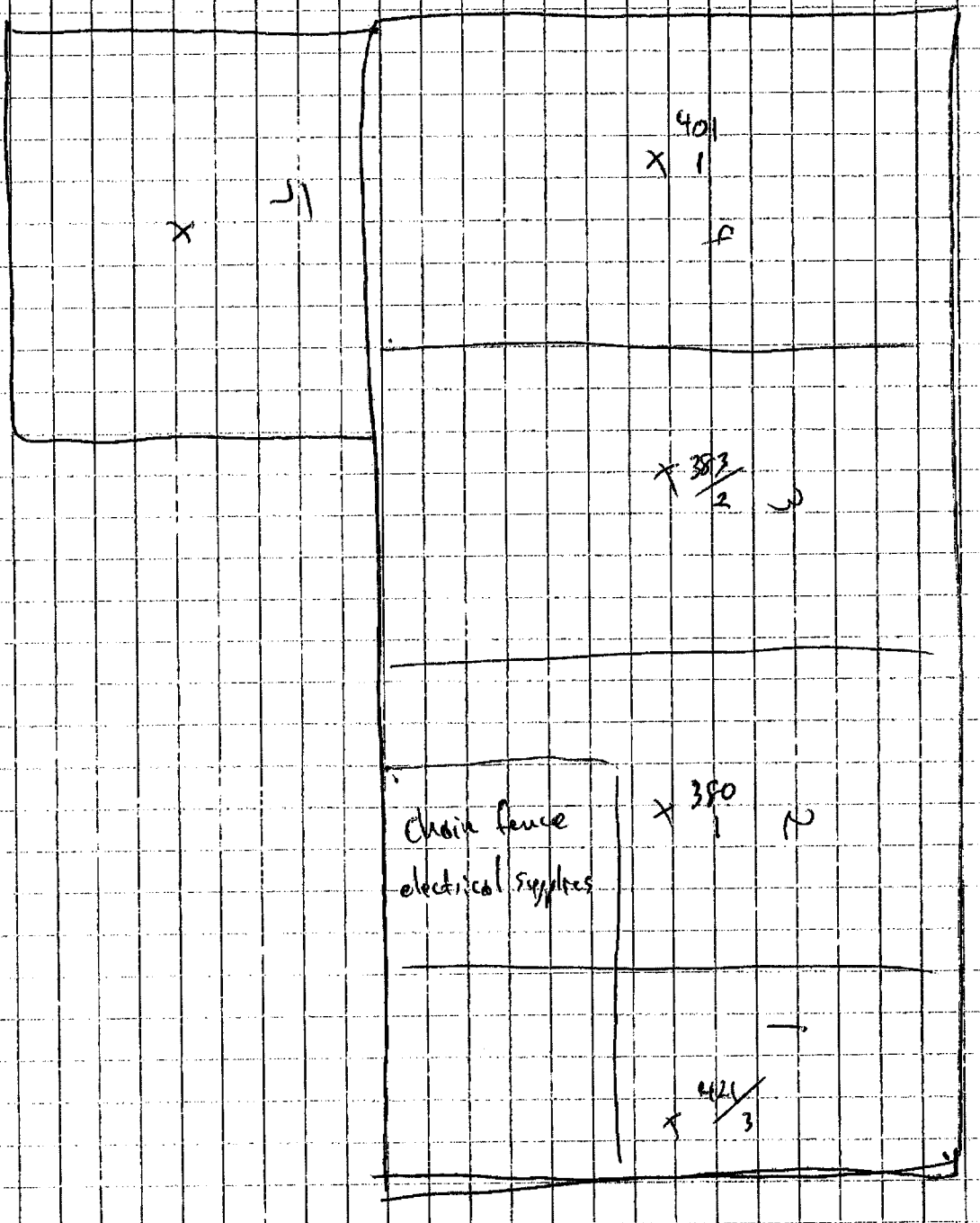

A
B
C
D
E
F
1
2
3
4
5
6
7
8
9
10
11
12
<10 all other
D-4


A
B
C
D
E
F

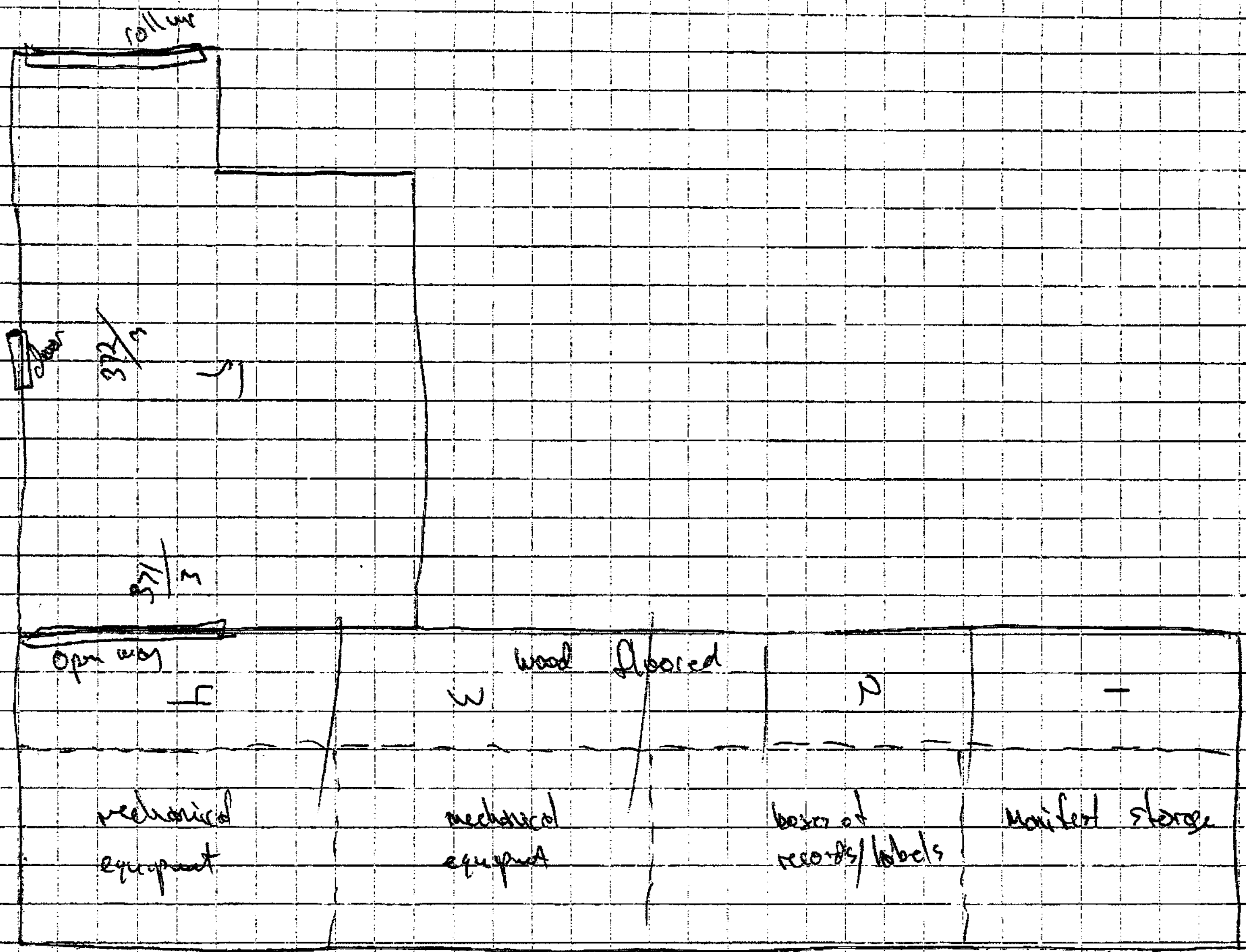
D-46 concrete floors

Office Furniture Supply

all r < 12 mR/hr



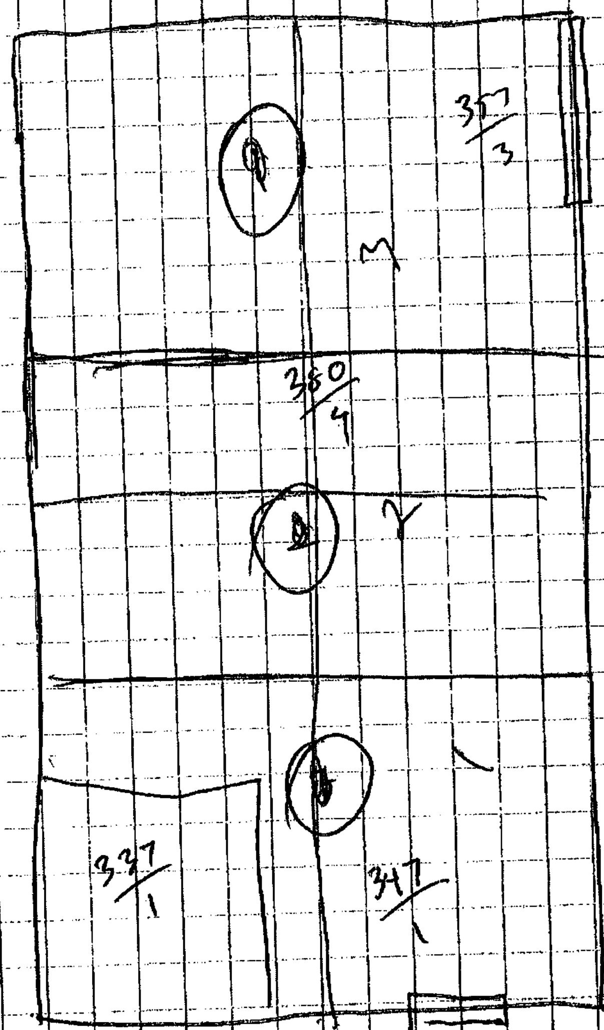
D-47 receiving - office



Charred in rooms

Floor questionable of soundness

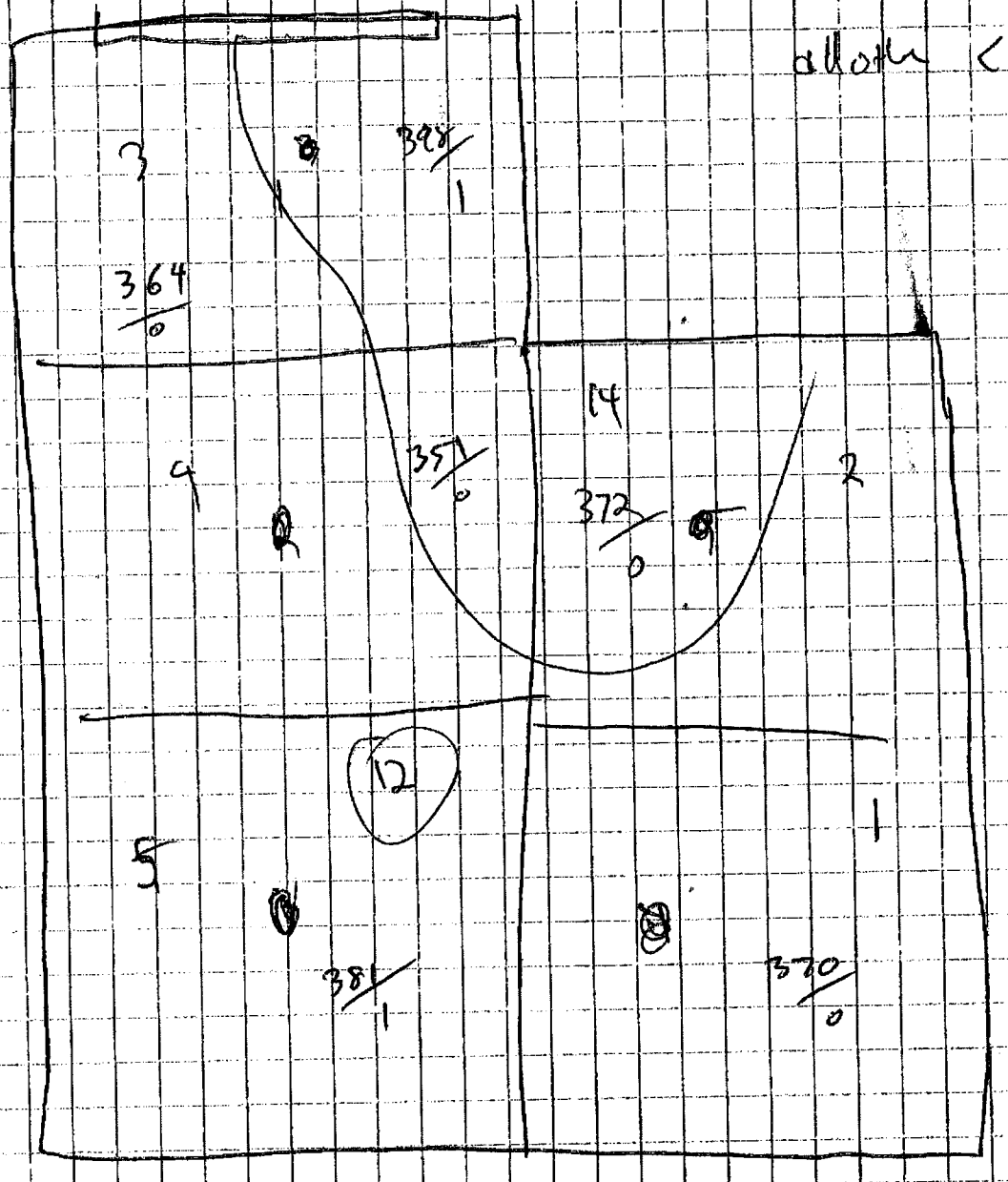
D-8



9-10 µR/hr
@ concrete floor

D-9

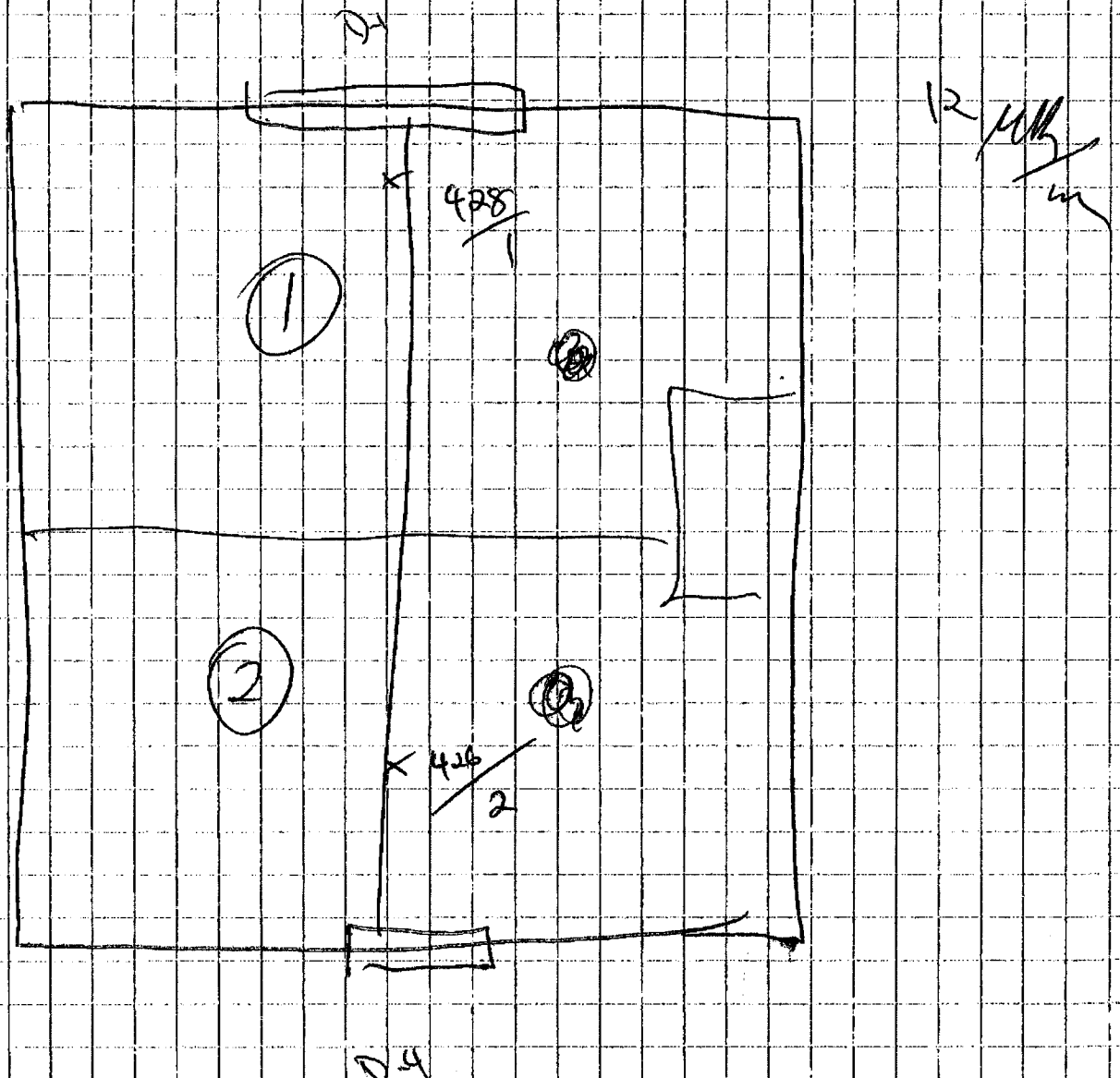
Vehicle garage



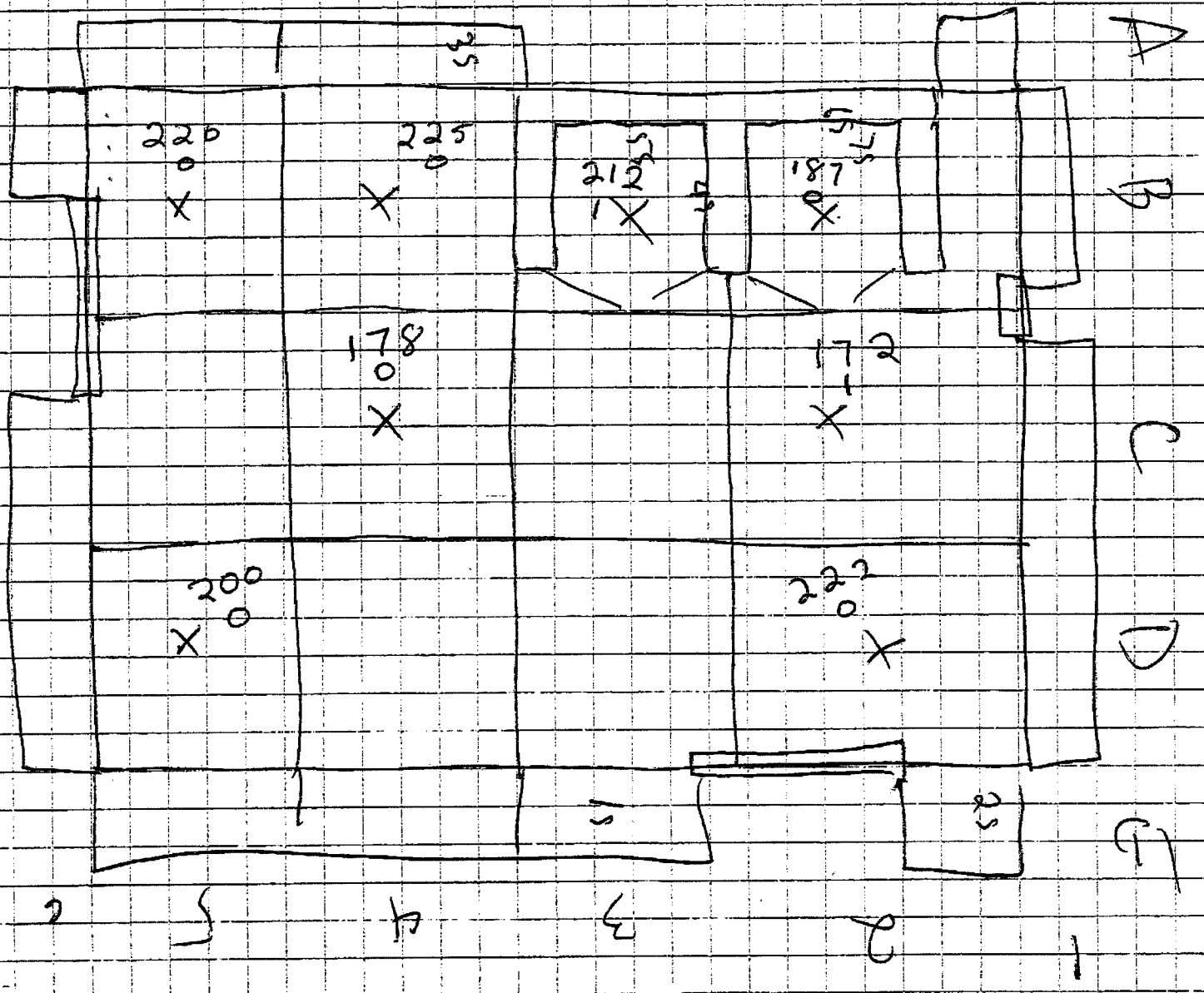
D-10

Mechanical storage

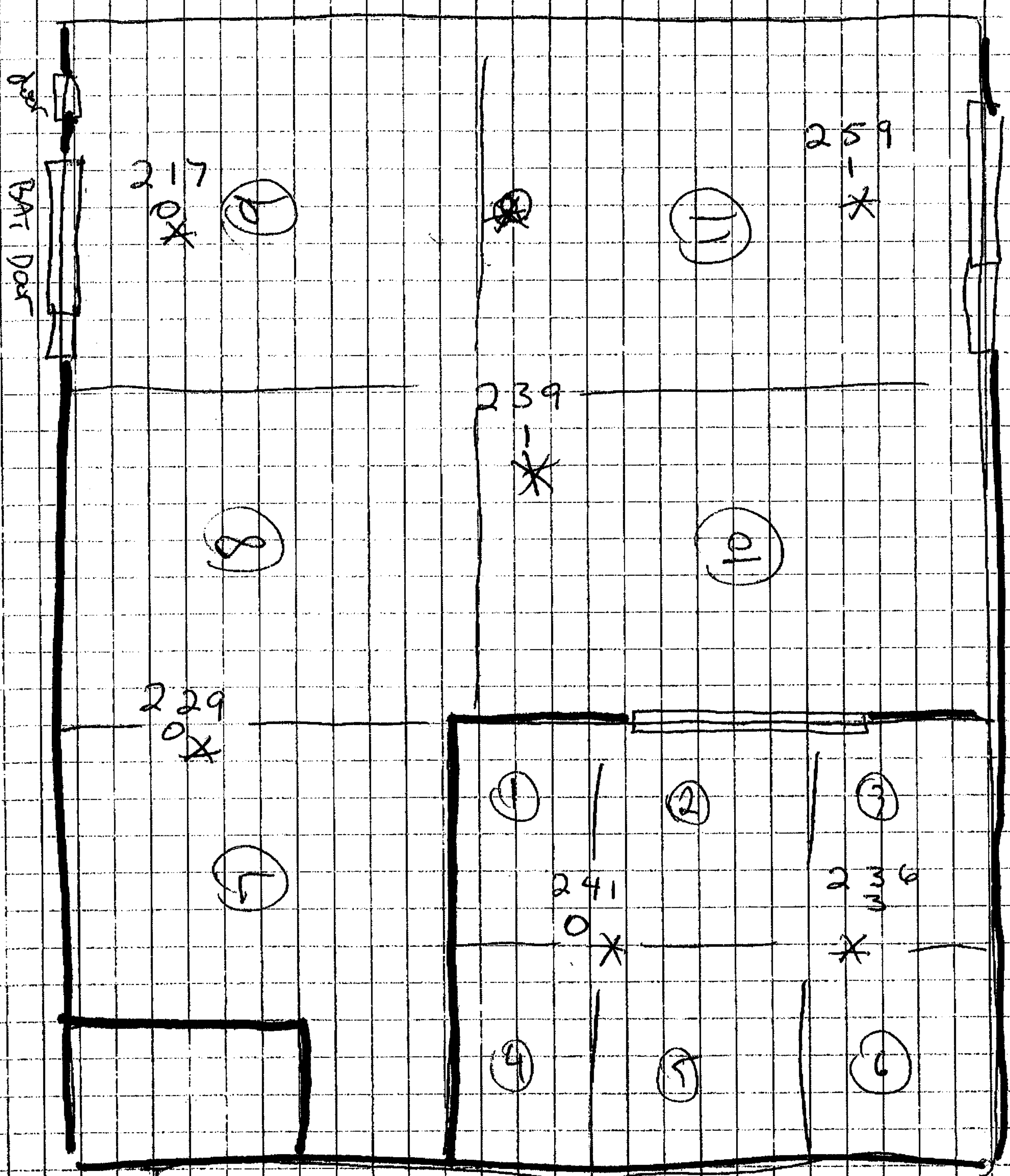
maintenance storage

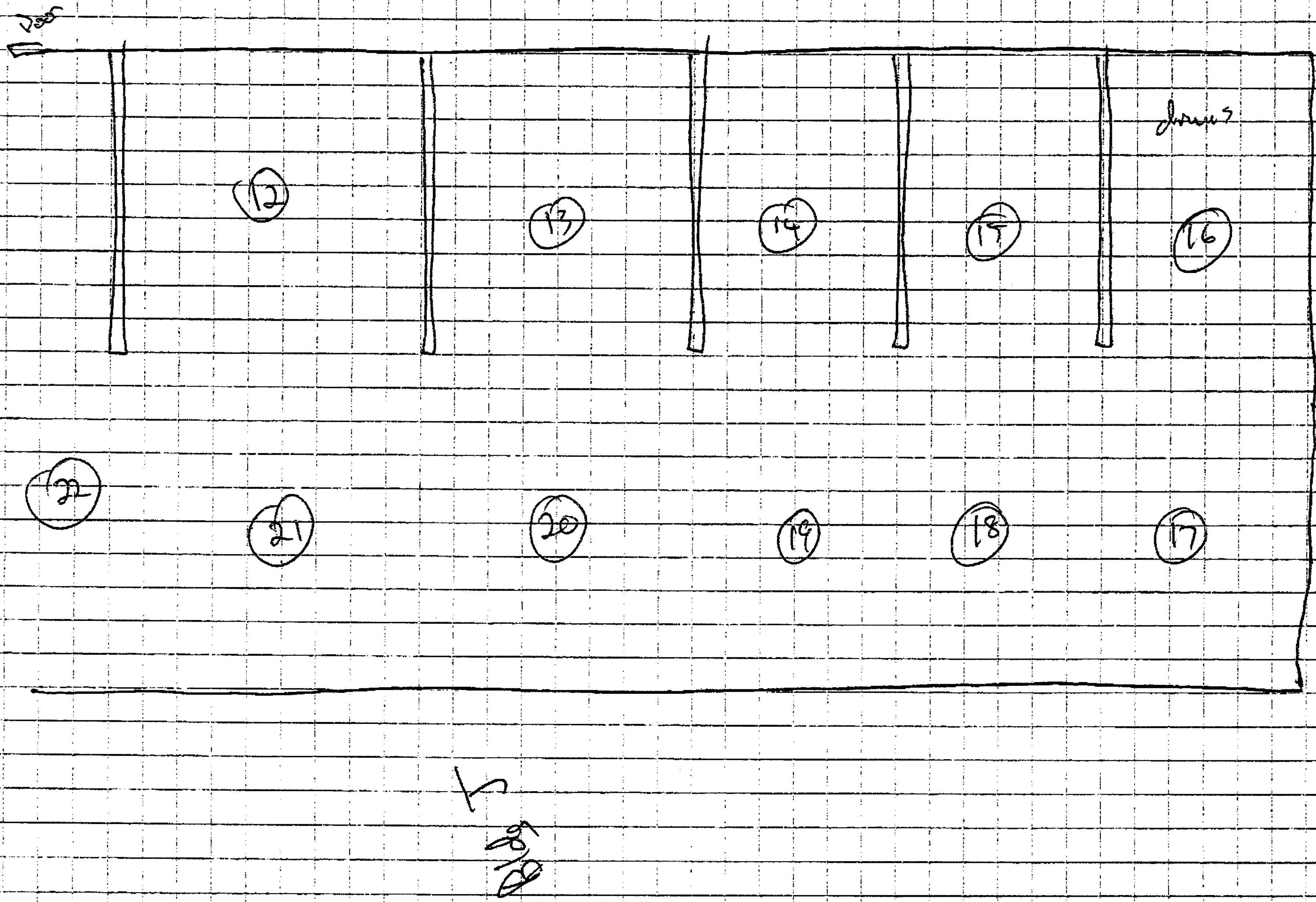


D-11

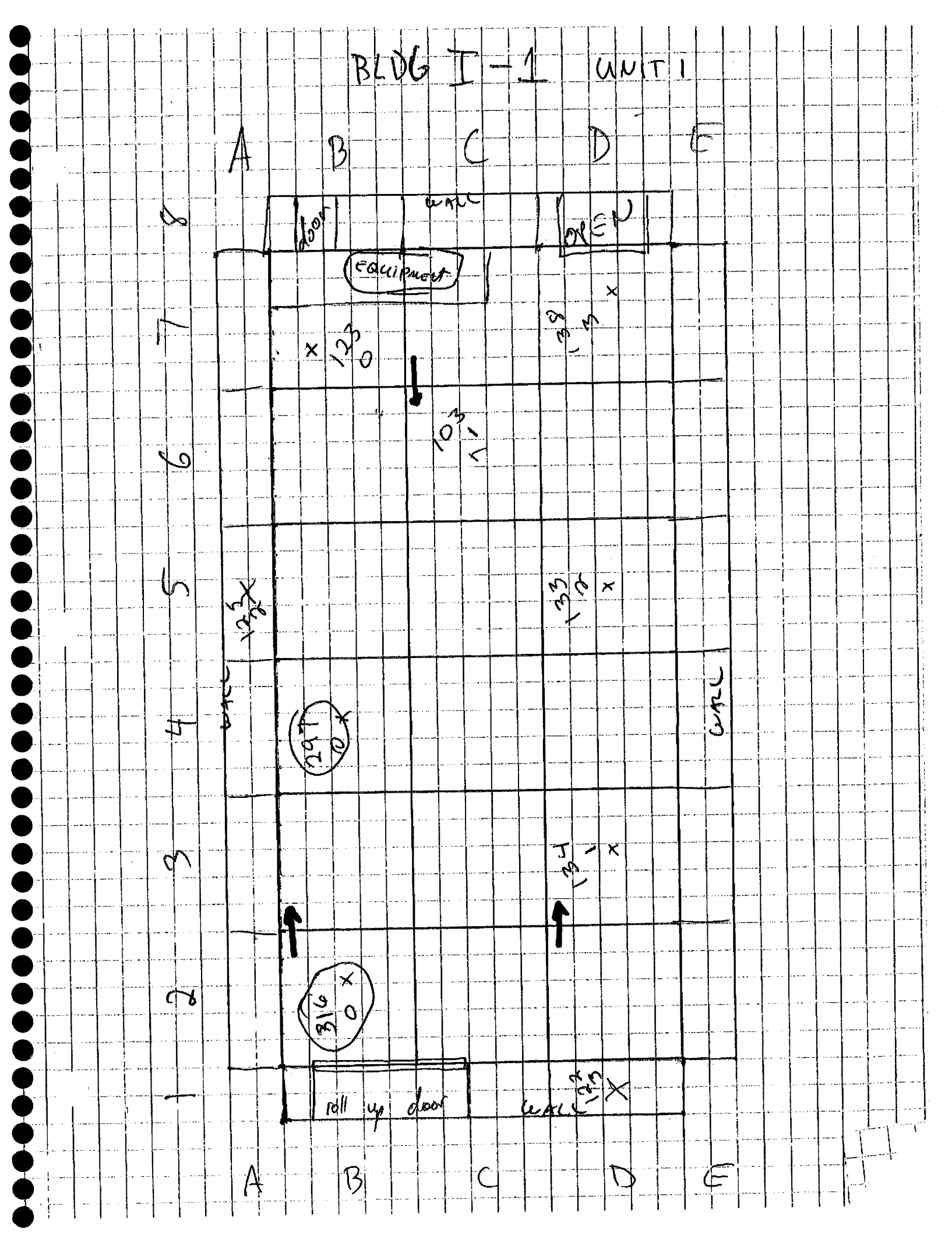


Bldg J



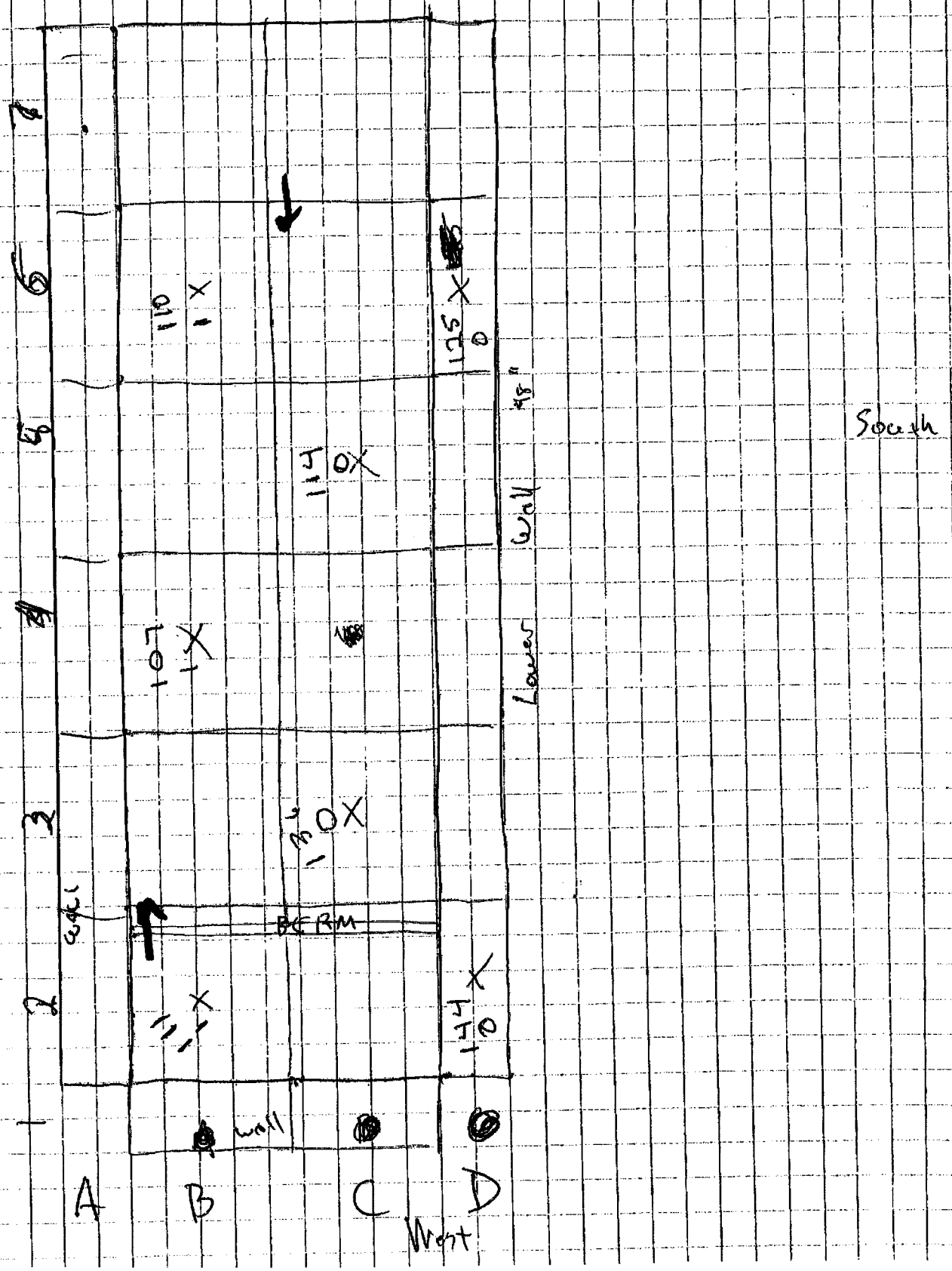


Door
Drums
12
13
14
15
16
22
21
20
19
18
17
Bldg J

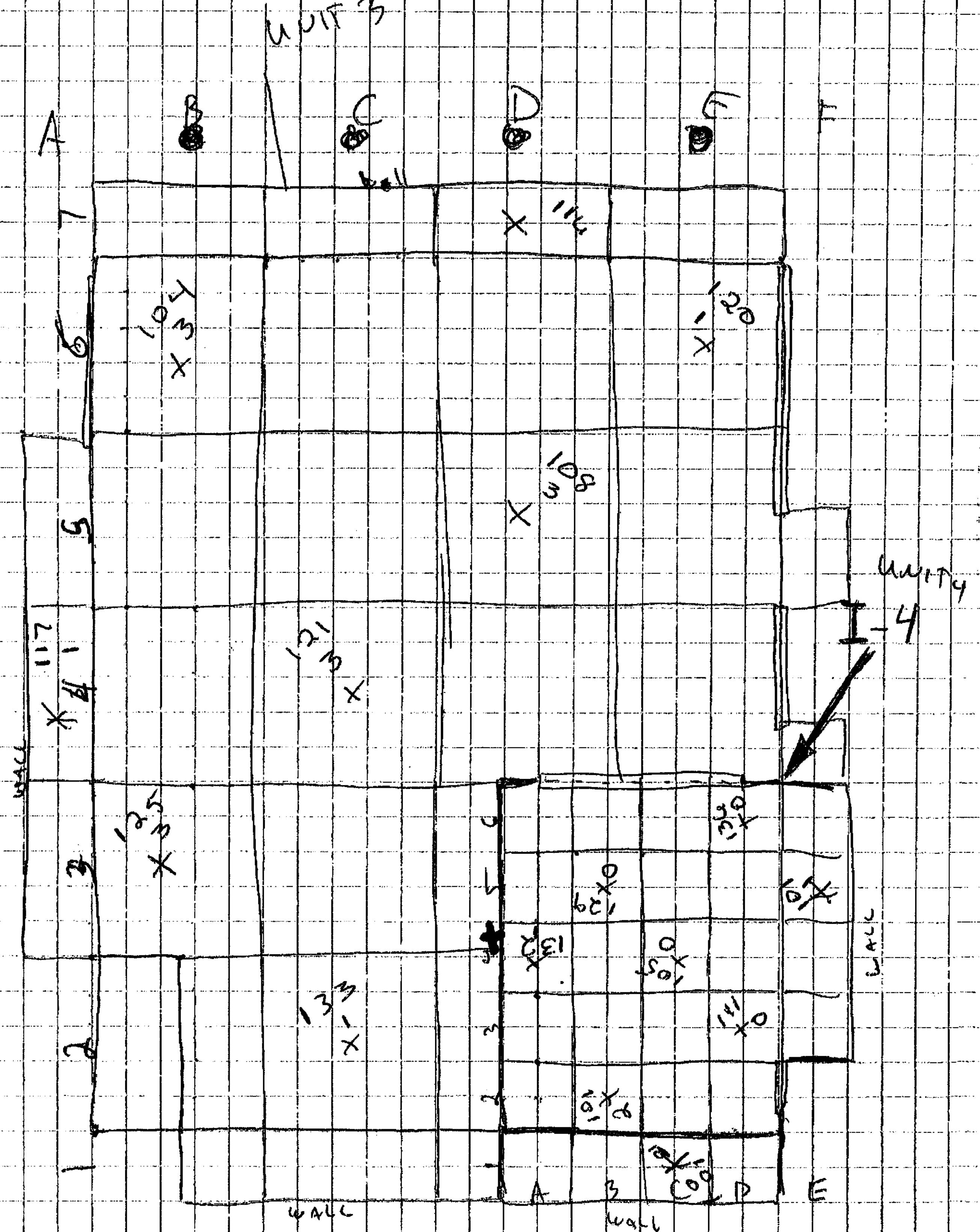

BLDG I-1 UNIT 1
A
B
C
D
E
8
7
6
5
4
3
2
1
door
OPEN
EQUIPMENT
roll up door

BLDG I-2 STORAGE BLDG

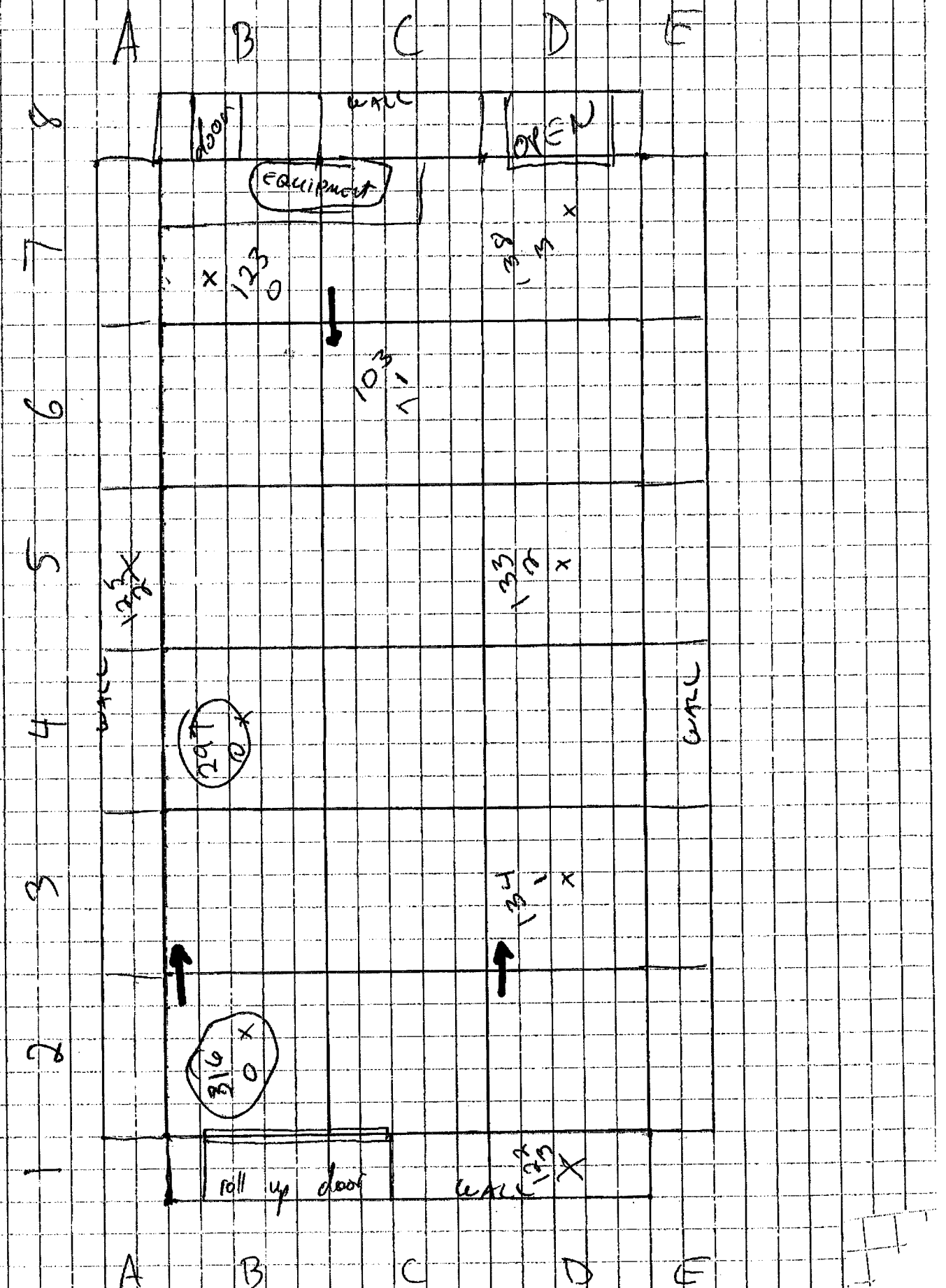
UNIT 2 East



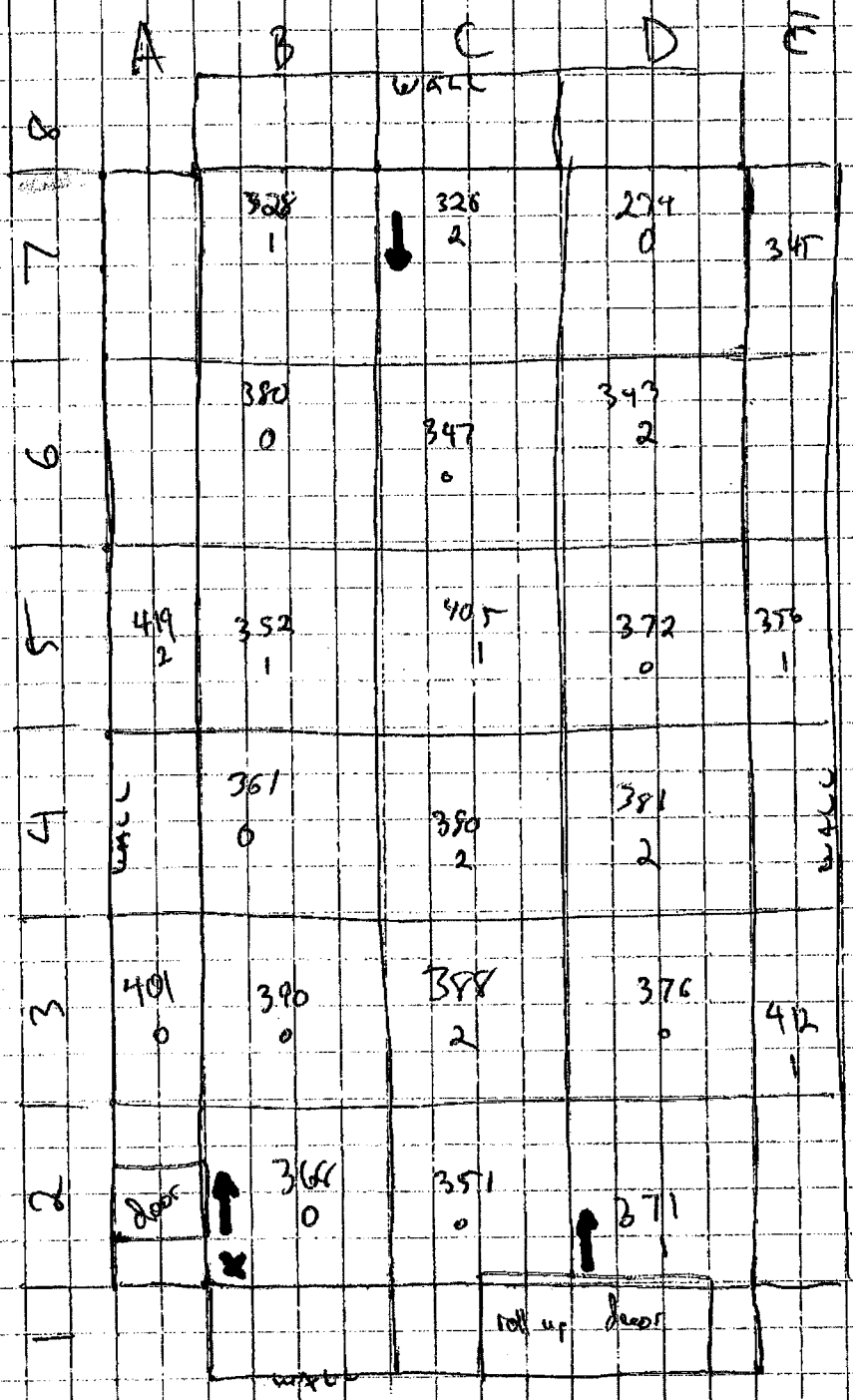
I-3 & 4


UNIT 3
A
B
C
D
E
F
wall
7
6
5
4
3
2
1
116
103
120
108
121
117
135
133
UNIT 4
I-4
WALL
130
129
107
131
105
141
WALL
A
B
C
D
E
WALL

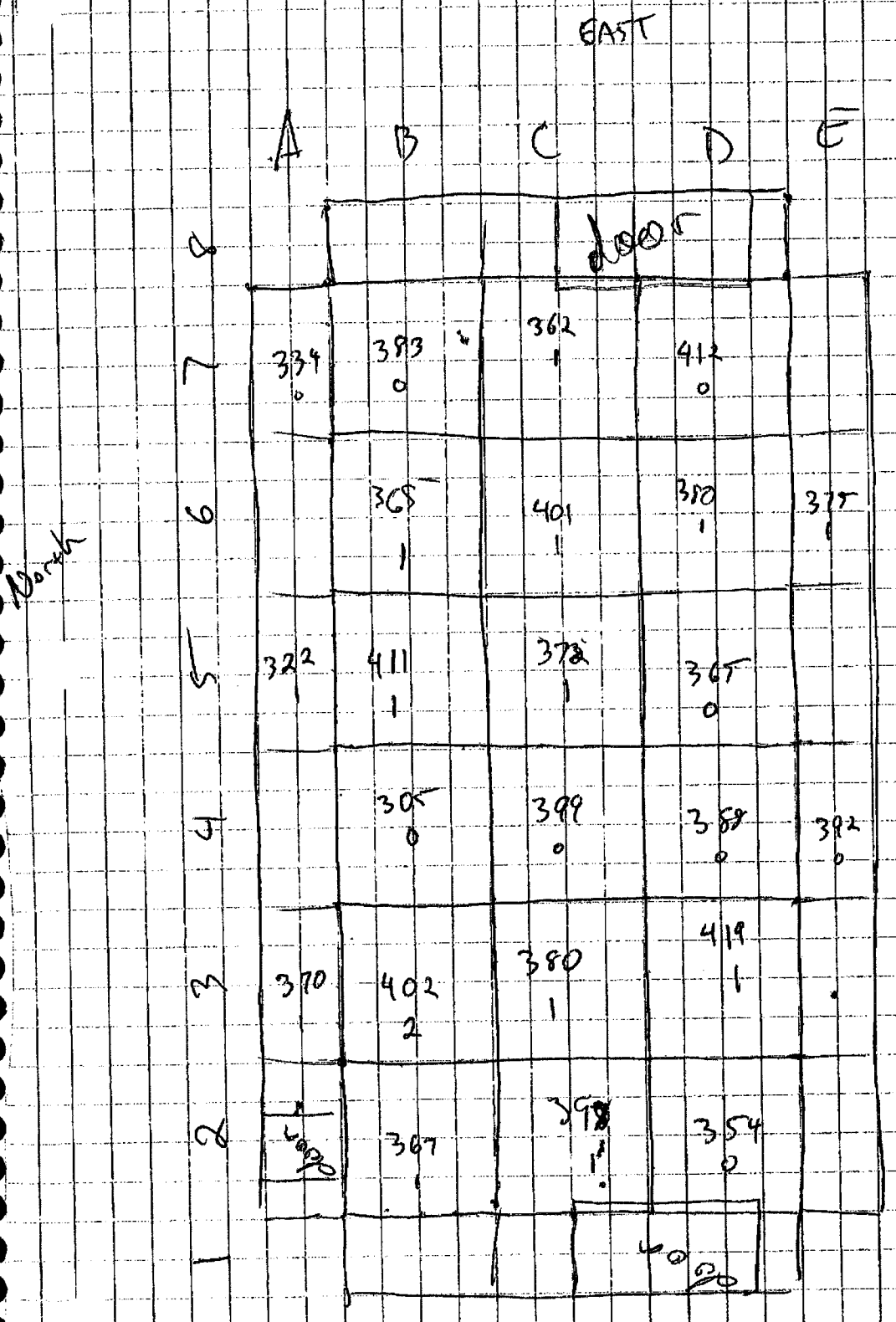
BLDG I-1 UNIT 1



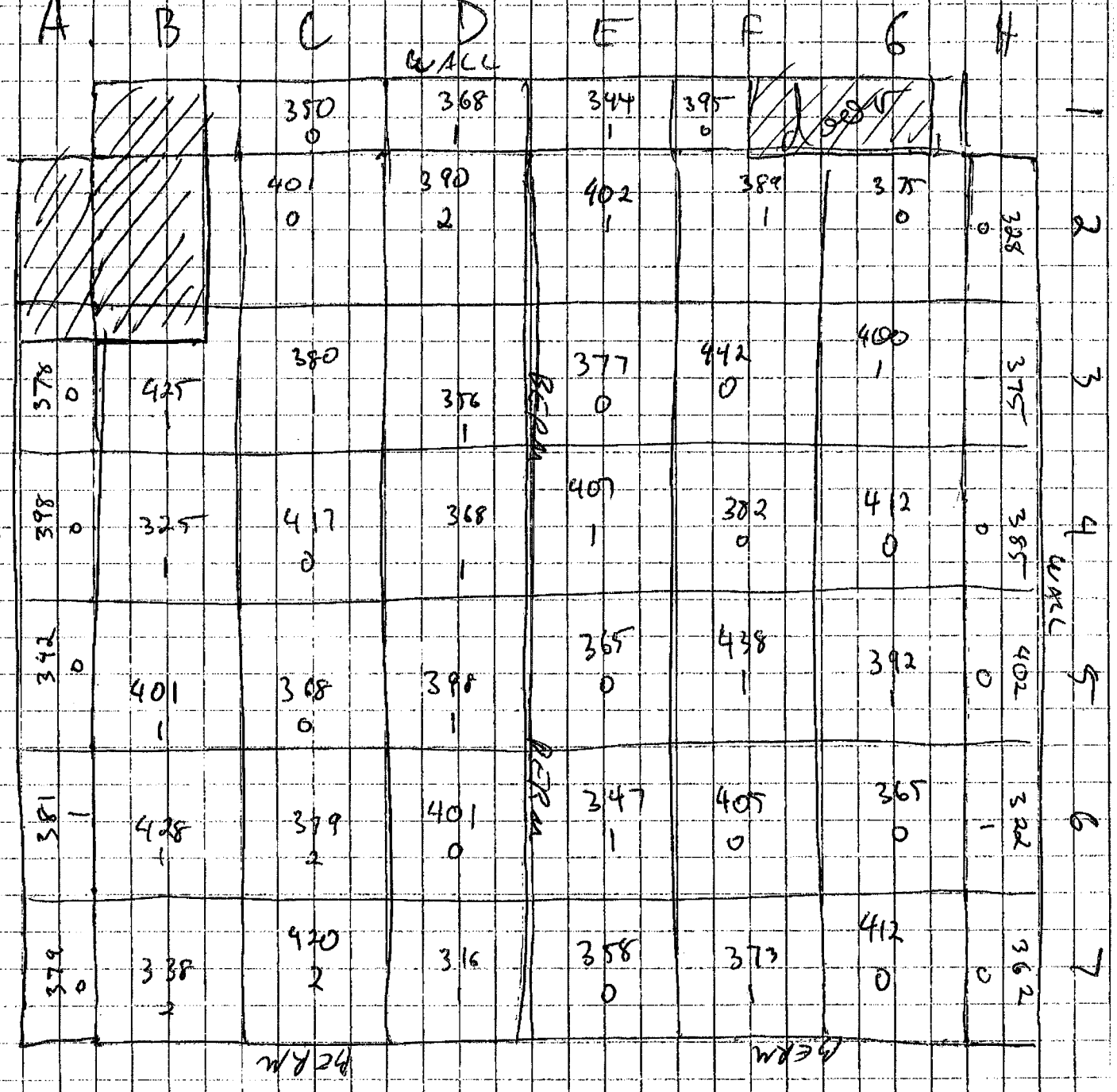
Bldg B-1


A
B
C
D
E
8
7
6
5
4
3
2
1
wall
328
1
326
2
294
0
345
380
0
347
0
343
2
449
2
352
1
405
1
372
0
356
1
361
0
380
2
381
2
wall
401
0
390
0
388
2
376
0
412
1
door
366
0
351
0
371
roll up door
wall

B-2


EAST
A
B
C
D
E
door
7
6
5
4
3
2
1
North
South
WEST
334
393
362
412
365
401
310
375
322
411
372
365
305
399
358
392
370
402
380
419
367
354
door

B-3 - permitted storage



10-10-13

DAH

RP.

B-41

Permitted Storage

A	B	C	D	E	F	G	H	
		BERM		BERM				
362 0	398 2	391 1	399 0	372 1	355 0	407 0	385 0	1
	369 0	423 0	352 0	344 1	409 0	405 1	337 1	2
door	400 1	414 1	401 1	412 0	342 1	391 0	388 0	3
wall 400 0	378 1	368 2	412 0	369 0	365 0	366 0	375 0	wall 4
398 1	356 1	379 1	395 0	421 1	376 1	414 1		5
375 1	402 0	365 0	358 0	396 1	378 2	389 1		6
		377 1	door wall		327 2			7

all $\delta < B_{ulk}$

Appendix VI

LICENSING DOCUMENTATION FOR USA ENVIRONMENT LP

Department of State Health Services

RADIOACTIVE MATERIAL LICENSE

Pursuant to the Texas Radiation Control Act and Texas Department of State Health Services (Agency) regulations on radiation, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Agency now or hereafter in effect and to any conditions specified below.

LICENSEE	This license is issued in response to a letter
1. Name: USA ENVIRONMENT LP ATTN DONALD A HALTER	Dated: February 9, 2011
2. Address: 10234 LUCORE STREET HOUSTON TX 77017	Signed by: Mike Nalepa
	3. License Number: L05616 / Amendment Number: 05
	PREVIOUS AMENDMENTS ARE VOID
	4. Expiration Date: May 31, 2019

RADIOACTIVE MATERIAL AUTHORIZED

5. Radioisotope	6. Form of Material	7. Maximum Activity	8. Authorized Use
A. Any radioactive material with atomic numbers 1 to 95	A. Solid, sludge, or liquid	A. As needed for each job.	A. Decontamination of pipe, land, buildings, equipment and materials contaminated with radioactive materials and recovery of sealed sources.
B. Naturally occurring radioactive material (NORM) as defined at 25 TAC+ Section (§) 289.259	B. Solid, sludge or liquid	B. As needed for each job.	B. Decontamination of NORM contaminated pipe, land, buildings, equipment and materials.

+Title 25 of the Texas Administrative Code

9. The authorized place of use is at temporary sites located at a customers facility, in areas not under exclusive Federal jurisdiction, throughout Texas.

10. Each site shall maintain documents and records pertinent to the operations at that site. Copies of all documents and records required by this license shall be maintained for Agency review at 10234 Lucore Street, Houston, Texas.

11. The individual designated to perform the functions of Radiation Safety Officer (RSO) for activities covered by this license is **Donald A. Halter.**

12. The licensee shall comply with the provisions of (as amended) 25 TAC §289.201, §289.202, §289.203, §289.204, §289.205, §289.251, §289.252, §289.257, §289.259, and §289.260.

13. Sealed sources containing radioactive material shall not be opened or removed from their respective source holders.

Department of State Health Services

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14. For decontamination services provided on facilities contaminated with:

    A. radioactive materials not associated with operations with naturally occurring radioactive materials (NORM), the limits of 25 TAC §289.202 shall be applied, and

    B. NORM, the limits of 25 TAC §289.259 shall be applied and shall prevail where different from 25 TAC §289.202.

15. Radioactive material shall be used by, or under the direct supervision of, individuals designated by the RSO only after each worker has successfully completed a training course conducted by the RSO. Documentation verifying the successful completion of the training for each worker shall be maintained by the licensee for inspection by the Agency.

16. Possession of material listed in conditions 5, 6, 7 and 8 sections A shall be incidental to decontamination of pipe, equipment, buildings and materials contaminated with radioactive materials, and recovery of sealed sources at the customers job site. At the conclusion of decontamination and/or recovery activities radioactive material shall be: returned to the original generator; transferred to authorized recipients and/or transferred to authorized radioactive materials disposal facilities.

17. A. The licensee shall provide written notification to the Agency at least five (5) days prior to commencing decontamination or remediation activities. If, for a specific case, the five-day limitation would pose an undue hardship on the licensee, the licensee may, upon notification to the Agency, obtain permission to proceed sooner. The notification shall specify the following:

    (1) type of operation,
    (2) the mode of decontamination (if more than one mode is authorized on the license),
    (3) address and physical location of the decontamination or remediation activity,
    (4) dates when the activity will be conducted, and
    (5) the name of the person in charge of the operation at the site.

    B. This information shall be addressed to the following:

    Department of State Health Services
    Inspection Unit - MC 1986
    ATTN: Manager, Radiation Branch
    PO Box 149347
    Austin, Texas 78714-9347 or
    by facsimile to: (512) 834-6654.

Department of State Health Services

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18. A. The licensee shall provide the following information in writing to the Agency within 30 days of the end of each calendar quarter following completion of decontamination work for a customer when contaminated material is left in the possession of the customer:
    (1) customer name,
    (2) customer mailing address,
    (3) customer telephone number,
    (4) quantity of contaminated material generated as a result of the decontamination process,
    (5) disposition of contaminated material,
    (6) method (e.g., drums) of storage of contaminated material,
    (7) site where material is stored (provide map if street address is not available)
    (8) location at site where material is stored, and
    (9) storage conditions (e.g., metal shed, pallets on open ground, etc.).

    B. This information shall be addressed to the following:

    Department of State Health Services
    Radiation Safety Licensing Branch – MC 2835
    ATTN: Manager, Radioactive Materials Group
    PO Box 149347
    Austin, Texas 78714-9347

19. Copies of the following documents and records shall also be maintained for Agency review at each temporary job site:

    (1) current amendment of License;
    (2) procedures referenced in License;
    (3) sections of 25 TAC Chapter 289 referenced in License;
    (4) records of the latest survey instrument calibration for the instruments in use at the site;
    (5) records of radiation surveys made for any release of equipment from the site;
    (6) records of analytical results made for the release of any material from the site; and
    (7) records of surveys and or analyses made to demonstrate compliance with the dose limits or occupational workers or members of the public.

Department of State Health Services

RADIOACTIVE MATERIAL LICENSE

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20. Except as specifically provided otherwise by this license, the licensee shall possess and use the radioactive material authorized by this license in accordance with statements, representations, and procedures contained in the following:

application dated May 10, 2009.

Title 25 TAC Chapter 289 shall prevail over statements contained in the above documents unless such statements are more restrictive than the regulations.

RRF:rrf

FOR THE DEPARTMENT OF STATE HEALTH SERVICES

Date February 15, 2011

Ray Fleming, Program Coordinator
Industrial Licensing Program

July 29, 2013

Tom Conley,
Director, Radiation and Asbestos Control Section
Bureau of Environmental Health
Kansas Department of Health and Environment
1000 SW Jackson Suite 330
Topeka KS 66612

Subject: Reciprocity Application Reid Supply/Safety Kleen Survey

Mr Conley,

USA Environment wishes to perform radiological work at the former Reid Supply facility located at 2549 North New York Ave, Wichita, KS. Listed below is a brief scope of the work to be conducted. Attached is the KDHE application for reciprocity with the supporting TX licensing documents.

Scope of Radiological Work:
USA environment will perform a screening survey of the entire property utilizing large-area NaI detector arrays in order to verify and supplement the survey information contained in the KDHE UFA report (2010). Surveys will be logged using GPS mapping. In addition, soil sampling will be conducted down to a depth of 24" with off-site analysis being performed for radium 226/228 concentration. A suitable background location will be determined with additional survey and sampling being conducted at that location for comparison to on-site data.

Activities are currently planned to begin August 7th, pending reciprocity approval by KDHE. The screening survey is expected to last three days.

Sincerely,

Don Halter, RSO
USA Environment LP

P.O. Box 87687 Houston, Texas 77287
Office (713) 425-6913 Fax (713) 425-6917
www.usaenviro.com

STATE OF KANSAS

RECIPROCAL APPROVAL OF RADIOACTIVE MATERIALS LICENSE

Pursuant to the Nuclear Development and Radiation Control Act (L. 1963, Ch. 290) and Kansas Annotated Regulations numbers 28-35-133 through 28-35-363 inclusive, and in reliance on statements and representations made to this agency by the reciprocal licensee designated below, a general license is hereby issued authorizing the licensee to conduct activities authorized in the specified license referenced in Item 6 within the state of Kansas in areas not under exclusive federal jurisdiction. This general license is subject to all applicable rules, regulations, and orders now in effect or placed in effect by the Department of Health and Environment and any conditions specified below.

1. Name USA ENVIRONMENT LP	4. Reciprocity Approval # 2013-075
2. Address 10234 LUCORE ST	5. Expiration Date December 31, 2013
	6. Reference License # L05616-05
3. City, State, Zip HOUSTON TX 77017	

Conditions

7. The use of radioactive materials in Kansas shall be in accordance with the radioactive materials license specified in Item 6 or the Kansas Radiation Protection Regulations whichever is more restrictive.

8. Radioactive material may not be used or stored in Kansas except in conjunction with a specific notification as required by this approval.

9. A copy of the State of Kansas Radiation Protection Regulations, Kansas Form RH-3 "Notice to Employees" and this Reciprocity Approval document must be in the possession of the users at the work site.

10. For each use of radioactive material in the State of Kansas the department shall be notified at least five days prior to engaging in any activity authorized by this approval. If, for a specific case, the five day period would impose an undue hardship the licensee may, with justification, request permission to proceed.

    These notifications shall, at a minimum, include the following:

    a. Specific job site location in Kansas. Include addresses and directions to the location(s).

    b. Current copy of the referenced radioactive material license(s) if it has been amended since this approval was granted.

    c. The specific period of time, including starting and ending dates and times, the radioactive material will be used in Kansas.

    d. The specific proposed use of the radioactive material.

    e. Contact information for the company performing the work:
        i. Individual's name
        ii. Address
        iii. Phone/fax/email

STATE OF KANSAS

RECIPROCAL APPROVAL OF RADIOACTIVE MATERIALS LICENSE

Supplementary Sheet

Reciprocity Approval # 2013-075

f. Kansas customer contact information
   i. Company name
   ii. Contact name
   iii. Address
   iv. Phone number

g. Operator/user name and evidence of training and qualifications (include copies of certifications).

h. Radiation Safety Officer

i. Radioactive materials to be used:
   i. Isotope
   ii. Activity
   iii. Number of sources
   iv. Exposure device
   v. Last leak test with results

j. Justification if the notice is less than five days before start date.

11. This approval does not authorize the transfer or disposal of radioactive material except as specifically provided under K.A.R. 28-35-194a.

12. The licensee shall possess and use radioactive material according to the most restrictive of the Kansas Radiation Protection Regulations; applicable regulations of the reference license issuing state/agency(s); this approval or statements, representations, and procedures contained in the documents and notifications submitted in support of this approval.

FOR THE STATE DEPARTMENT OF HEALTH AND ENVIRONMENT

Date 8/2/2013

By: 

Thomas A. Conley, CHP
Radioactive Material Licensing